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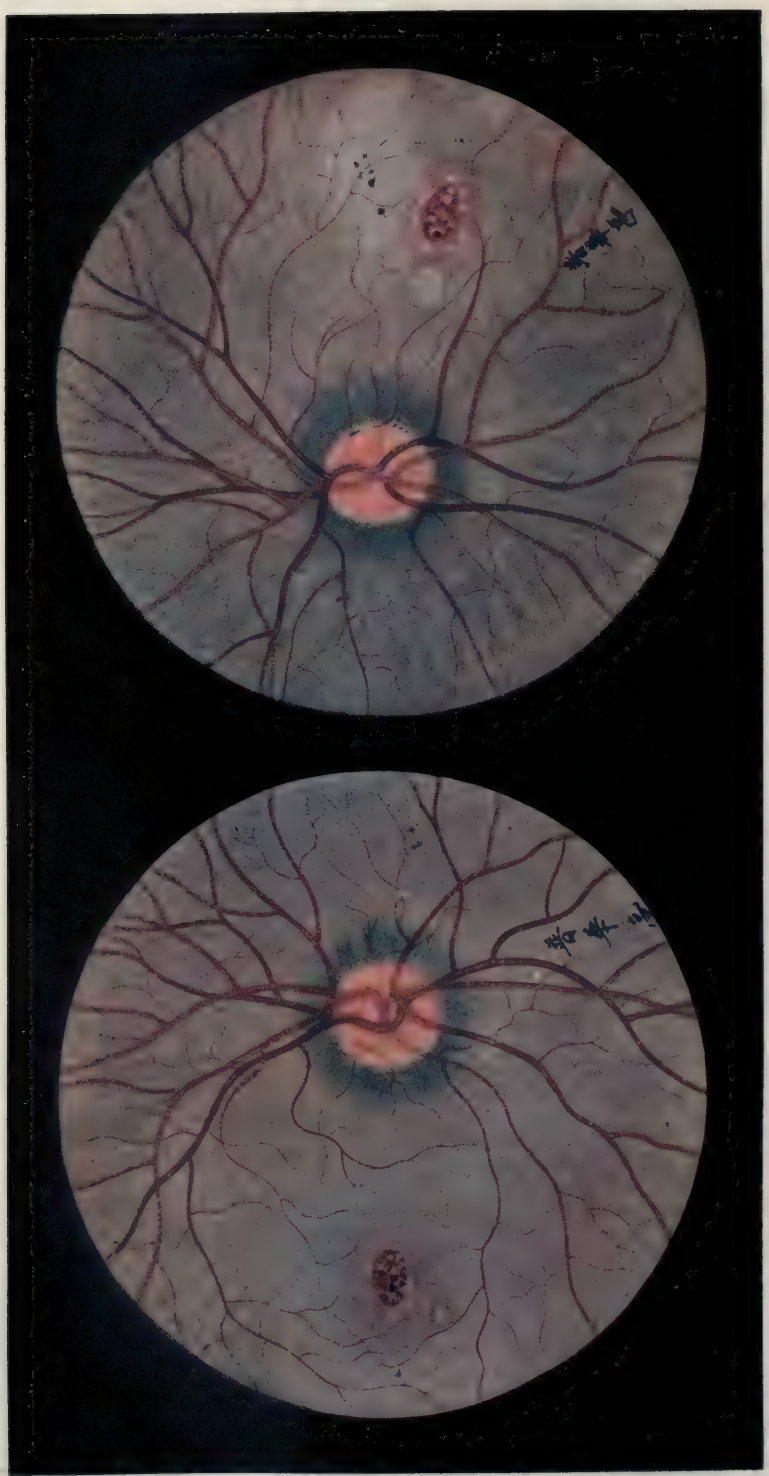

RIGHT EYE LEFT EYE

BILATERAL HOLE IN THE MACULA DUE TO ONE INJURY. CASE OF DR. T. M. LI
APPEARANCE ONE YEAR AFTER INJURY.

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HOLE IN THE MACULAR REGION OF BOTH EYES DUE TO SIMULTANEOUS INJURY.

DR. T. M. LI.

PEKING, CHINA.

This is a unique case of traumatic hole in the macula, both eyes being affected by the same injury. Improvement of vision occurred under treatment. The charts give the effects on the field of vision. The color plate shows the appearance of the lesions in the macula; and in other parts the normal fundus of the Chinese.

A Chinese soldier came to the eye clinic of the Peking Union Medical College Hospital on February 19, 1921, for treatment of blurring of vision of both eyes. He was sent by his commanding officer from Taiyuanfu, the capital of Shansi Province, a city two hundred miles from Peking. He was 22 years of age, alert, well built and strong.

The history as given by him on admission was, that eight months ago, while playing in a game of soccer, which is becoming a common sport in China, he was struck squarely on the face by the foot-ball. The force was so tremendous that he was knocked violently to the ground. He was unconscious for about ten minutes, and had to be carried to the barracks. It is uncertain whether this state was caused by the force of the blow or by the violence of his fall.

After regaining consciousness he experienced great difficulty in opening his eyes, probably due to the irritation of dirt particles or corneal abrasions. When he finally succeeded in opening them, he noticed that all objects appeared hazy and reddish. Two days later, objects appeared greenish to his right eye. Within a month this symptom disappeared, but his vision was much impaired. Instead of seeing green at the same time as his right eye did, his left eye saw many black lines and spots. In a few days these disappeared, and then objects appeared greenish to this eye. As with the right eye, this symptom gradually disappeared during the course of a month, but his vision was very much impaired. Prior to the injury, the vision of both eyes had always been excellent. His vision slowly improved for a period of about three months, but came to a standstill after that.

Upon examination the following findings were noted: Vision R. 6/20 and L. 6/60. No lenses improved his vision. Tests by the retinoscope and ophthalmoscope prove his eyes to be practically emmetropic. External examination shows nothing abnormal. Both pupils are semidilated, the right being a little larger than the left. Both react somewhat sluggishly to light and accommodation. Consensual reaction is present, but also rather sluggish. The tension of both eyes is normal.

There is no nystagmus or squint. Patient fixes with either eye, but complains of a central shadow when he does so. With a Peter's campimeter, the right eye shows a relative central scotoma, oval in shape, with its long axis horizontal. Above, below and to the nasal side it extends to about 5° from the center; the temporal side to about 7.5°. The left eye also shows a relative central scotoma, slightly smaller than the right and more irregular in shape. Beneath this there is a relative paracentral scotoma, shaped like a small bean and somewhat larger than the central one. The patient sees the test object clearly in all other parts of the field. Color vision is not affected except in these areas. (Fig. 1.)

Ophthalmoscopic examination revealed the following findings: R. The media are clear, disc almost round and

slightly hyperemic, its margin sharply defined and regular, arteries normal, veins slightly engorged where they emerge from the disc. There is a thin film of grayish fibrous membrane covering a small area of the center of the disc. The fundus is normal with the exception of the macular region. A little more than two disc diameters to the temporal side of the disc, there is a dark red sharply defined oval area. Its long axis is practically horizontal, and its length is about two-thirds of a disc diameter. Its width is a trifle less than one-half of a disc diameter. This red oval area has a decidedly punched out appearance suggesting a hole. Within this hole, there are numerous small whitish spots of various sizes. Surrounding the oval, there is a hazy, reddish ring, which is of a lighter shade than the color at the bottom of the oval hole, but darker than the surrounding retina. Within this zone of red and close to the margin of the hole, with the exception of the upper temporal quadrant, there are numerous small, fairly round white spots. Immediately beneath the temporal end of the hole are several round yellowish spots. Beyond the outer zone of red, there are numerous fine whitish radiating striae. Between the disc and the hole, and about one disc diameter below the level of the two, there is a stippled area which measures about one-third disc diameter across. No floating opacities visible in the vitreous.

L. Media clear, disc slightly vertically oval, a little hyperemic, margin regular and well defined, arteries and veins normal. About two and one-half disc diameters to the temporal side of the disc and below the level corresponding to the lower margin of the disc, there is a dark red oval hole which looks exactly like the one seen in the right eye. The long axis lies in about the 165° meridian. This oval is a trifle smaller than the right. The same kind of a light red zone surrounds it. In the oval hole and around its margin there are also numerous fairly round yellowish and whitish spots. The former are generally smaller than the latter. A little above and a little to the nasal side from the hole, there are several light yellowish round spots. Immediately above the hole and extending above and to the temporal side there is a large whitish patch approximately twice the size of the disc. This area is stippled with numerous fine discrete pigmented spots. No floating opacities in the vitreous.

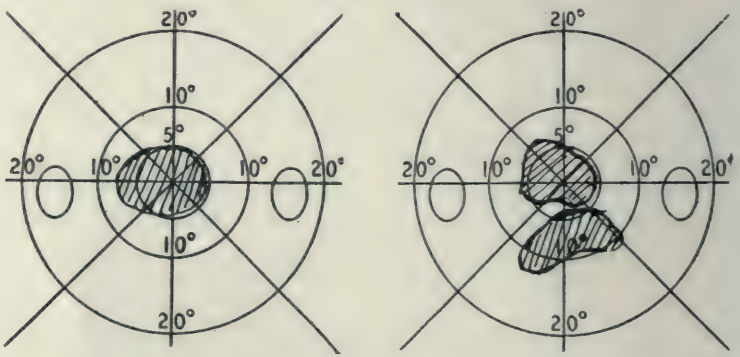

Fig. 1.—Diagrams of the relative scotomas, determined by Peter's campimeter. Obviously it was very difficult to map out these areas, since the central vision was affected; but after considerable effort and many explanations the result as shown above was obtained.

A blood Wassermann was performed and found to be negative. The urine was also normal.

With the history of a blow on the eye, the immediate impairment of vission, and the characteristic fundus picture, the diagnosis of hole in both macular regions was made. According to the patient's statement, the greatest force of the blow was received on the right side of his face, but from the fact that the vision of both eyes was im-

mediately diminished, the cause of which is apparent from the damage seen in both macular regions, it is obvious that the blow must have struck both eyes quite squarely.

The Chinese, as a race, have a wide, low nasal bridge, and a low superciliary ridge. Their eyeballs as a rule are not so deeply set in the orbits as those of a Westerner; consequently they are not so well protected. In this soldier's

Fig. 2.—Patient who suffered hole in the macula of both eyes from one blow.

case, as seen by the picture, his eyes would be considerably exposed to such injury as he received. Under the same circumstances, a Westerner would probably have a monocular involvment, since his comparatively high nasal bridge and prominent superciliary ridge would very likely divert the direction of the ball away from one eye. If the force were very severe, he would probably have a fracture of the bridge of his nose in addition to a monocular injury.

No treatment except potassium iodid, 0.30 gm. t.i.d. has been given. For three months following the first visit his vision slowly improved. On April 19, that is, at the end of two months, his vision was R. 6/20 and L. 6/20 minus 1. On April 29, his vision was R. 6/15 minus 1, and L. 6/20. On May 26, it was R. 6/15 and L. 6/20. The improvement in vision, which has probably come to a standstill, was quite marked in his left eye. (Fig. 3.)

The colored picture, Plate I, represents the condition of the fundus of the eyes about four and a half months after they were first seen, or about one year after the injury. Numerous changes have occurred during this period. Tho not marked, they may be of interest to report: The hole in the macula of the right eye was originally very much darker red in color; the white spots within the hole were much smaller and less numerous. The reddish ring surrounding the hole was narrower and less distinct. There were only three or four round spots surrounding the margin of the hole and they were much smaller and less distinct. The radiating striae were fewer and much less conspicuous than at present. The changes both within and around the hole of the left eye are the same as those of the right eye. The atrophic patch above the hole was not so white and extensive, but the areas of pigment were larger and less numerous. The several light yellowish round spots, a little above and to the nasal side from the hole, were not seen when the patient was first examined. All the changes are indicative of atrophy and fibrous contractions.

The hole in the macula of the right eye involves the fovea centralis. In the left eye, the hole is below the fovea, which, however, is included in an area of degenerative changes involving both retina and choroid.

The writer has searched the literature as far as possible, and finds that all reported cases of hole in the macula due to traumatism have been monocular. The only case of binocular involvement of the retina was described by R. Foster Moore in the March issue of the Ophthalmic Review in 1910. But in his case there was a hole in the macula of the right eye only, altho

a circular area of edema existed in the macula region of both eyes.

Major Middleton, in the American Journal of Ophthalmology of November, 1919, reported 23 cases of hole in the macular region discovered in the course of an examination of 100,000 recruits. All of these cases were monocular in character, and each presented a history of previous injury to the affected eye. Major Maxey in the same issue reported three cases of hole in the macula found among colored troops whom he had examined at Camp Sherman. These also were monocular and associated with history of previous injury. It is interesting to note that the majority were baseball injuries.

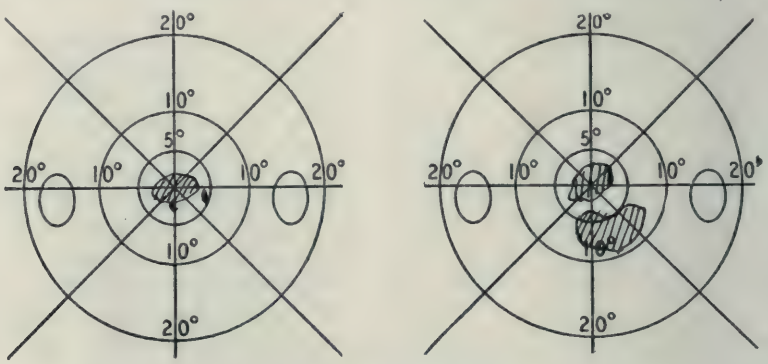

Fig. 3.—There was considerable diminution in the course of three months in the size of the scotomas as seen by the above diagrams.

In the American Encyclopedia of Ophthalmology, the statement is made that cases have been reported in which there was no history of trauma found at all, and that such cases are usually associated with some other pathologic conditions of the eye like ulcerative keratitis, uveitis, albuminuric retinitis, iridocyclitis, etc. If the above statement is made for the purpose of proving that the etiologic factor of some cases of hole in the macula may be some extra- or intraocular inflammation, the argument to the writer seems to be weak. For in the first place, the inability to secure a history of trauma does not necessarily exclude the trauma factor, any more than a physician's inability to obtain from a case a history of syphilis should warrant his definitely excluding that disease from further consideration. In the second place, the associated ocular inflammation referred to could easily have been coincidental. At any rate, any one of these inflammations could have existed in a low grade of practically quiescent state since an injury in childhood, which could have caused the hole in the macula. The flare up later in life could have been brought about by focal infection or by trauma of an operation. The inference therefore is that all cases of hole in the macula are probably of traumatic origin.

The special features of this unique case are:

1. The binocular character of the case, which is probably the only one on record.
2. The first case of hole in the macula reported in a Chinese.
3. The anatomic peculiarities of the Chinese face explain the possibility of producing a hole in both macular regions from a simultaneous injury.
4. The injury was sustained while playing a Western game. Most of the cases recorded were caused by injury during play.
5. The slow improvement of vision during the course of a year following the injury. Whether or not the administration of potassium iodid assisted in the improvement of vision is impossible to state, but the treatment apparently was worth the trying.

THE TREATMENT OF TUMORS OF THE HYPOPHYSIS.

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This paper mentions the therapeutic results reported by others, and gives the record of two cases in which X-ray treatment was followed by striking improvement. The exact dosage and method of application is given.

The diagnosis and treatment of tumors of the hypophysis has progressed considerably in the last fifteen years. Regarding the early diagnosis, the evidence from X-ray examination and the examination and photography of the base of the brain and the sella turcica play an important part. Regarding treatment, surgical or rhinologic intervention is now adopted to interrupt the course of the disease and to prevent total blindness. In these methods some advance has been made. The Horsley-Killian intracranial operation, the Schloffer-Eiselberg nasal operation, the Chiari-Kahler paranasal operation and the Hirsch intranasal operation are so dangerous, from the point of view of infection thru cerebral abscess or meningitis, that we welcome all procedures which do not open the skull and yet attempt to influence the degenerative effect, i.e., the atrophy of the tumors.

Beclére, at the Society of Parisian Hospital Physicians in 1908, declared that the X-ray plays an important part not only in the early diagnosis of tumors of the hypophysis, but also in their treatment. He has reported five cases in which the vision was improved and the field enlarged. After him, Gramenga-Gunsett. Darier, Fleischer, Jüngling and Gavazenni reported cases in which X-ray treatment was followed by amelioration and cure. Küpferle and von Szily have declared that they consider operation indicated only when there is rapidly increasing compression of the brain. It is also indicated in teratoma, glioma or sarcoma which resist X-ray treatment. These tumors are not radiosensible. Finally Schaefer, of the clinic of Jadason, reported four cases in which there was great improvement. He has determined the technic of raying and the strength of ray necessary to penetrate sufficiently deep, and yet not to cause any disagreeable epiphenomena, such as the falling of hair or discomfort in the eye.

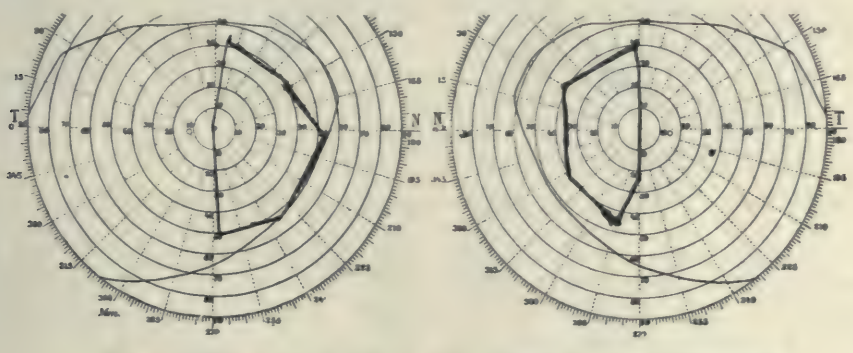

Fig. 1.—Fields of Case 1, July 17, 1920. Typical bitemporal hemianopsia

I shall not discuss the technic, as I am not versed in Roentgenology, but shall refer the reader to Schaefer's essay, published in Strahlentherapie. For the treatment, the arrangements must be of the best as the rays must penetrate to a depth of 7cm. For this symmetric instruments are necessary.

The following cases were treated by me with the advice of Dr. E. Bird, Roentgenologist. The result, especially in one of them, seems to justify a detailed report.

CASE 1. A merchant, 43 years old, came to me on July 17, 1920, complaining of great fatigue on reading and of the letters running together. This was

so great as to prevent his performing his office duties. There was no external change in the eyes; they moved freely; the pupils were clear, but there was decoloration in the papillae, especially externally, and in the lower sector internally. Vision was R. 5/10, L. 5/15, not improved by glasses. In the visual field there was a typical temporal defect, bitemporal hemianopsia (Fig. 1).

He had no syphilis; the nose and the frontal, maxillary and ethmoid sinuses were negative. The nervous system was normal according to the examination of E. Frey, a teacher in the University.

The Roentgen examination by Dr. Bird showed that the sella turcica was enlarged to twice its normal size, and its walls were greatly attenuated. The lines of the skull were noticeably enlarged. The sphenoid sinus was compressed by the enlarged sella turcica. My diagnosis was therefore confirmed by the Roentgen examination.

The patient was treated by X-ray. There were in all three treatments, each lasting two hours, each side of the skull being rayed for half an hour. There were no disagreeable results, other than the insignificant headache and the Roentgen nausea.

After each treatment, I examined the vision and the fields. On December 11, 1920, the boundaries of the fields extended in several places beyond the median line. In each eye the vision was 5/10, even 5/7 partly. Especially conspicuous was the subjective improvement. The patient was soon able to return to his work. There was no change in the fundi. The decoloration as it was on December 11, is shown in the accompanying illustration. The treatment ceased at this time, but I have continued to examine the patient's fundi, vision and fields.

Case II. This patient, 49 years old, was the wife of one of my colleagues. He had observed in November, 1917, disease in the left eye. By September, 1919, she had lost the vision of this eye. She first came to me in May, 1920. There was atrophy of the left optic nerve. Vision R. was 5/5. The fundus, the central color vision and the field were entirely normal.

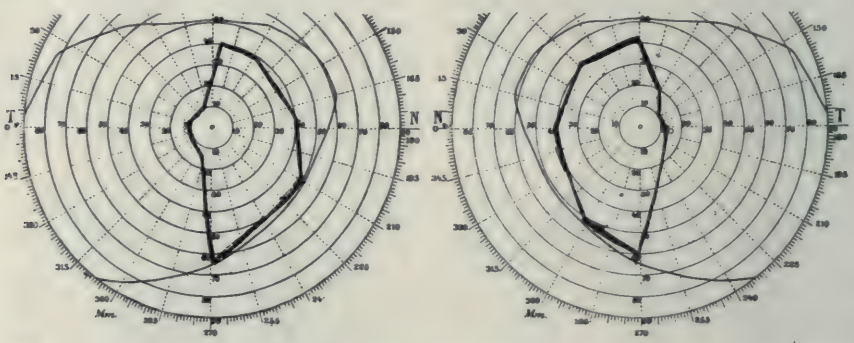

Fig. 2—Fields of Case 1, December 11, 1920. Extending beyond median line so as to include fixation point.

Examinations of the nose, the nasal sinuses, the urine, the blood and the nervous system were all negative. The Roentgen examination of the base of the brain and the sella turcica showed a slight extension of the latter. This was not so characteristic as to make the diagnosis positive, especially as there was no contraction of the right visual field (Fig. 3) and no change in the nervous system. I suspected the disease to be tumor of the hypophysis and advised observation.

After a period of rest, the vision of the patient's right eye had on September 14th, diminished to 5/30. There was a central scotoma for color, concentric contraction of the visual field, and paling of the optic nerve. By the end of October, she became totally blind. But the paling of the papilla did not keep pace with the blindness. I consulted Professors Ranschburg

and Balint but they considered the diagnosis uncertain. They suspected a disease of the internal secretions, but were unable to affirm that it was tumor of the hypophysis. Other symptoms, such as the early cessation of menstruation and the falling of the hair from the arm pits, had seemed to me to confirm that diagnosis. The patient was quite apathetic and indifferent to what was done for her. She was annoyed by the examinations and consultations of physicians, and begged to be let alone. Her face wore an agonized expression.

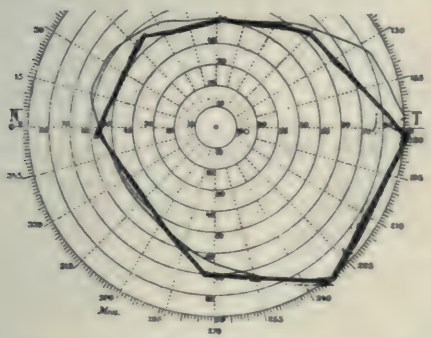

Fig. 3.—Right field of Case 2, May 20, 1920

At this time, the report of Dr. Bird on the X-ray findings was that the sella turcica had increased in size downward as well as longitudinally and latitudinally. A little above the location of the posterior clinoid process, there was a spot the size of a pepper corn and calcareous in density. It might be a particle of the posterior clinoid process separated by ulceration, but was probably a calcareous excrescence. The anterior clinoid process was thick and there were traces of acromegaly. The posterior part of the sphenoid sinus was indented, and in the axial plate it could be seen that the sella turcica was enlarged in a transverse direction.

The diagnosis of tumor of the hypophysis was finally confirmed, and the advice of Dr. Bird for X-ray treatment was accepted. The first treatment took place October 1st, lasting for two hours, each side being exposed for half an hour. It was followed by severe Roentgen nausea, headache, vertigo and nervousness. The patient was obliged to remain in bed, not recovering until the 12th of October. Light perception returned in the right eye, and improved from day to day, so that she could count fingers at from 1 to 2 M. and recognize large objects. However, there was still a slight defect in the external part of the field and the appearance of the fundus, including the decoloration, remained the same.

On the 24th of December, a second treatment was given. This was followed by less nausea. She could count fingers at 3 M., and the visual field was enlarged into the external portion. The patient was satisfied with her vision and was enabled to carry on her household duties. Her interest in life began to return and she seemed brighter and less irritable. The third treatment was administered in the middle of January, and was followed only by slight nausea.

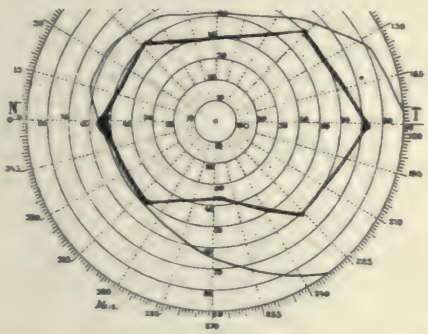

Fig. 4.—Right field of Case 2, December, 1920

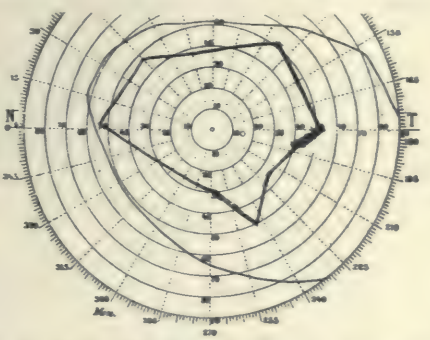

Fig. 5.—Right field Case 2 following improvement by X-ray treatment

When I examined the patient on January 31, vision had increased to 5/10 with +5.0 sph. She read the fifth row of Liebermann's reading book. The

visual field was enlarged and had lost its hemianopsic character, altho there was a greater defect in the inferior portion of the field than in the superior portion. At the center of the field, she recognized red, green and blue, which she had not been able to do since September, 1920. The appearance of the fundus was unchanged. The patient was in excellent spirits.

I cannot explain the improvement in these two cases, and neither could the other observers. They say that the radiosensible part of the tumor was destroyed. One circumstance is certain, that the tumor was radiosensible; but what its pathology was and what anatomic or microscopic change took place, aplasia or atrophy, we cannot affirm. The optic nerves permit for a time a certain degree of compression, and we can thereby explain the increased conductibility of the nerve fibers. At all events I considered it my duty to report the cases to my colleagues that they too might experiment with Roentgen treatment in tumors of the hypophysis.

A CLASSIFICATION OF CORNEAL AFFECTIONS.

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United action for the selection and adoption of a standard classification of corneal affections is here proposed. A form for such classification is suggested, and the need for something of the kind brought out by a collection of the enormous number of terms used in the literature to designate these different conditions.

Students of ophthalmology must be impressed with the confused terminology and the chaotic classification of corneal affections. In my endeavor to correct this confusion, I have collected from the various text-books on ophthalmology and the general literature of the subject the varied and various modern and obsolete terms relating to corneal affections, and have prepared a schema, which I hope will precipitate interest and criticism, so that in the end a standardization of ophthalmic nomenclature may be obtained.

No classification is perfect; but in this instance the one that is based upon the embryo-histologic arrangement of the cornea, I believe can be best appreciated. Difference of opinion as to the etiology or origin of certain corneal diseases might cause minor changes.

In its final analysis, the subject is too broad for one mind, for several other items should be considered; as for example, the adoption of appropriate terms for the three main divisions—ulcerative, nonulcerative, and degenerative, and not the use of "keratitis" for all; and whether the terminology should be uniformly expressed in Latin or English. It might not be out of place for me to suggest that an international committee be arranged to standardize the terminology for this and other ophthalmic subjects.

In explanation, I have attempted to arrange the corneal diseases according to the histology, beginning with the epithelial layer; citations of the literature, where the original article or a good abstract may be found; and a word concerning some obscure title, are given.

A CLASSIFICATION OF CORNEAL AFFECTIONS.

(a) Opacities of the Cornea.

(b) Changes in Size, Curvature, Position and Form of the Cornea.

(c) Nonulcerative Keratitis.

(d) Ulcerative Keratitis.

(e) Degeneration of the Cornea.

(a) *Opacities of the Cornea.*

Congenital Opacities.

1. Visible nerves of cornea.

2. Congenital scar formation (inflammatory or traumatic); Embryotoxon; Anomalies.

Acquired Opacities.

1. Inflammatory.

2. Noninflammatory.

3. Traumatic.

(b) *Changes in Size, Curvature, Position and Form of Cornea.*

1. Microcorneal.

2. Ectasia—Staphyloma, Keratectasia, Keratoconus, Keratoglobus (megalocornea).

3. Vertically oval cornea.

(c) *Nonulcerative Keratitis.*

Pannus (syn. k. superficialis vasculosa; k. pannosa).

Types: *P. Phlyctenulosus* (syn. p. eczematosus, scrofulosus, lymphaticus) *P. Lenticularis* (lentigo); *P. Fibrosis of Vernal Conjunctivitis; P. Herpetic; P. Leprosus; P. Trachomatosus* (syn. k. trachomatosus; k. pannitic—Theobald); stages—P. tenuis; P. vasculosus; P. crassus; P. carnosus; P. sarcomatous; P. siccus; P. rebelis; P. follicularis; P. granulosus.

Keratitis Punctata Superficialis—Fuchs (syn.) k. subepithelialis centralis—Adler; k. maculosus—Reuss; k. Bombay—Herbert's disease; k. tropical punctate—Westhoff's and Kirkpatrick's disease (Elliot); k. punctata subepithelialis—Gradle; k. nummular—Stellwag; k. herpetic; k. sand-blast—Fox); Allied types *Keratitis Superficial Linear*—Spicer (syn. k. alphabet or k. büchstaben—Haab) *Keratitis Diffusa Superficialis* and *Keratitis Superficialis Catarrhalis*—Myashita; *Keratitis Flame-shape Marginal Epithelial*—Spicer; *Keratitis Marginalis Periodica Fugax*—Attias.

Keratitis Marginalis Vesiculosa—Gradle.

Keratitis Neuropathic. Types, *"Dellen"*—Fuchs; *Gaule's pits; Keratitis Herpetica; Keratitis Neuroparalytica.*

Keratitis Parenchymatosa (syn. k. interstital; k. diffuse interstitial; k. diffusa; corneitis scrofulosa—McKenzie; k. syphilitica et scrofulosa; k. strumous; k. syphilitica; k. specific; k. inherited; anterior uveitis; k. profunda).

Allied Types: *Keratitis Punctata Syphilitica* (syn. k. punctata profunda; k. interstitialis punctiformis specifica—Hock; k. punctata vera—Mauthner); *Keratitis Gummatosa*—Re (syn. k. nodular—Wicherkiewicz); *Keratitis Interstitialis Centralis Annularis*—Vossius; *K. Secondary Parenchymatous*—Elschnig; *Gummatous Infiltration of Cornea*—Elschnig; *Salmon Patch*—Hutchinson (syn. k. vasculosa profunda; k. deep vascular; k. marginalis vasculosa; k. vascular interstitial); *K. Anaphylactic*—Wessely.

Sclerosing Keratitis—von Graefe (syn. sclero-keratitis).

Keratitis Profunda—Arlt. (syn. central parenchymatous infiltration; k. parenchymatosa circumscripta).

Keratitis Disciformis (syn. k. annularis et disciformis—Fuchs; k. disc-like; abscessus corneae; abscessus siccus).

Keratitis Marginalis Profunda—Fuchs.

Keratitis Pustuliformis Profunda—Fuchs.

Keratitis from Special Causes. k. frigore; k. cocain; k. toxic; k. fetal; k. congenital; k. malarial; k. dental; k. pyorrheal; k. diabetic; k. dysenteric; k. gonorrheal; k. innoculation; k. antityphoid vaccin; k. syphilitic or luetic; k. nasal; k. rheumatic; k. oyster-shucker; k. professional or occupational; k. tuberculous; k. leprous; k. nodosa; k. trypanosome; keratosis corneae; psoriasis corneae; k. wasp-sting; k. melanite—Perrin; pemphigus corneae; k. emetin; k. myxedema—Collins; k. naphthalin—Casper; k. punctata onchocerca—Luna.

Ill chosen terms commonly used to describe a condition—not an infection. Keratitis Striata (syn. streifen keratitis; k. striped; striate opacity; fädenförmige—Schirmer; traumatic lattice-form opacity—Caspar; k. traumatic).

Keratitis Punctata (syn. "K P"; mutton fat deposits; descemetitis; keratite pointille; k. postica—Noyes).

(d) *Ulcerative Keratitis.*

Erosion of Corneal Epithelium. Types: *Relapsing Erosion of Cornea* (syn. k. relapsing traumatic; k. erosion; k. recurrent or relapsing; k. traumatic exfoliating; detachment of corneal epithelium; ulcus corneae superficiale; traumatic keratalgia—Arlt; k. relapsing bullous—Nettleship; k. Nagel (k. fingernail—Hensen); *Keratitis Filamentosa* (syn. fädchenkeratitis—Leber; k. filiformis; k. threadlike).

Keratitis e Lagophthalmo—von Graefe

(syn. k. desiccation; k. xerotica—Feur; degenerescence cireuse—Gallemaerts).

Ulcer of Pannus Trachomatosus.

Phlyctenular Ulcer (syn. kerato-conjunctivitis; k. lymphaticus; k. pustulosa; k. strumous; k. tuberculous; k. scrofulous; k. marginal phlyctenular; photophobia infantum—Fox).

Types: *Keratitis Eczematous; Keratitis Fasicularis* (syn. vascular fasicular; k. vasculosa; k. tenulosa; k. frenular; k. snail-track).

Neuropathic Ulcers. Types, *Herpetic Ulcers* (syn. k. herpetica; k. vesicular; k. stellata). (1) Herpes Corneae Neuralgica—Schmidt-Rimpler; (2) Herpes Corneae Febrilis—Horner; (3) Herpes Corneae Zoster (syn. zona ophthalmica); *Keratitis Dendritica*—Horner (syn. dendriform ulcers—Grout; k. dendritica ex ulcerans mycotica—Emmett; k. malarial—Kipp; k. furrow—Schmidt-Rimpler; k. arborescens; k. dumb-bell—Buxton; keratite ulcereuse en sillon etoiles); *Keratitis Neuroparalytica* (syn. k. trophic; k. neuropathic; k. exposure; k. anesthetica; desiccation neuritis).

Marginal ulcers. Types: *Infected Marginal Ulcer*—Zur Nedden; *Small Marginal Ulcer* (senile)—Fuchs; *Marginal Ulcers from Conjunctivitis; Marginal Ring Ulcer* (syn. circular ulcer, annular ulcer, k. ulcerativa marginalis—Martin; k. groove); *Marginal Phlyctenular Keratitis; Keratitis Marginalis Superficialis*—Fuchs.

Ulcers from Skin Diseases: variola, vaccine, varicella, acne rosacea (syn. k. rosacea; rosacea ocularis—Troncoso); erythema multiform, pemphigus and leprosy.

Ulcus Rodens (syn. ulcer Moorens; creeping ulcer; chronic serpiginous ulcer—Nettleship; k. chronic nonpurulent).

Simple Traumatic Ulcer.

Ulcus Serpens—Saemisch (syn. k. hypopyon—Roser; hypopyon ulcer; onyx; Saemisch ulcer; abscess of cornea—Arlt; pneumococcus ulcer; k. purulenta; acute serpiginous ulcer; k. suppurativa profunda; serpent ulcer; sloughing ulcer; creeping ulcer; septic ulcer; progressive ulcer; necrotic corneal abscess; torpid purulent infiltration of cornea—von Graefe), Allied types: *Keratitis Atypical Hypopyon* (syn. atypical ulcus serpens of diplobacillary origin—McNab).

Ring (annular) Abscess of Cornea—Fuchs (syn. annular infiltration of cornea).

Keratomalacia—von Graefe (syn. k. xerotica; necrosis corneae; infantile corneal ulceration; exhaustion ulcer; xerosis of corneal epithelium; marasmic ulcer; xerophthalmic keratomalacia. Allied type: *Marantic Ulcer.*

Internal Corneal Ulcer—von Hippel (syn. k. internal).

Ulcers from Special Causes. Tuberculous ulcers; k. actinomycosis; gonorrheal ulcer; k. aspergillus; keratomycosis aspergilliana (schimmelpilz k.); k. malaria; k. exanthematous; k. variola; k. varicella; k. erysipelas; k. postvaccine; k. amenorrhea; k. traumatic; k. marble-workers; k. oyster-shuckers; k. farmers (harvesters or reapers); k. diplobacillary; k. pneumococcus; k. b. pyocyaneus; scabes of cornea; mustard gas purulent ring infiltration—Mayou; sphincteralgic ulcer—Morax.

(e) *Degenerations of the Cornea.*

(1) Pannus Degenerativus.

(2) Fatty Degeneration—*Arcus Senilis* (gerontoxon); *Senile Marginal Atrophy* (syn. peripheral furrow keratitis—Schmidt-Rimpler; chronic peripheral sulcus ulcer; marginal sclerosis; dystrophie marginale symmetrique).

(3) Hyalin Degeneration—*Nodular Opacity*—Groenouw (syn. guttate opacity—Fuchs; k. guttate; drüsen formation of Bowman's membrane—Roemer). *Lattice Shaped Opacities*—Haab (syn. k. grill-like; k. gittrige; k. gitterförmige; grate-like opacity or k. pannel-like; k. trellis; k. reticulate or reticular; tessellated opacity; corrugation of Bowman's membrane—Byers; keratite quadrille). *Family Punctate Cornea Degeneration*—Fehr. (syn. interstitial punctate opacity—Gunn).

(4) Calcareous Degeneration—*Zonular Opacity*—Fuchs (syn. k. calcareous; ribbon-shaped opacity; k. ribbon; k. riband-like; calcareous bands of cornea; k. trophica; k. band; k. band-shaped; k.

bandoletta; k. en bandolettes; k. en bandes; k. bandolet; k. bandförmige—von Graefe; transverse corneal film; k. petrificans—Suker; girdle-shaped corneal clouding—Arlt; symmetrical opacity—Clarke; calcification of Bowman's membrane—Roemer; k. trophic—Magnus). *Progressive Interstitial Calcareous Degeneration*—Axenfeld.

(5) Vesicular Degeneration. K. *Vesiculosa et Bullosa* (syn. k. cullosa).

(6) Hyalin, Amyloid, and Calcareous Degeneration in Corneal Scars. *Atheromatous Ulcers*—Fuchs (syn. sequestrating scar keratitis—Wintersteiner).

(7) Dystrophies (Keratitis Avascular) *Dystrophie Epithelialis Corneae*—Fuchs.

(8) Blood-staining of Cornea.

(9) Peripheral Pigmentation of Cornea.

(10 Keratosis and Xerosis Corneae.

REFERENCES.

In the general classification, the headings "a," "b." "c," are largely taken from Axenfeld's Lehrbuch (chapter by Elschnig) and elaborated.

Pannus lenticularis (lentigo) Amer. Ency. Ophth., p. 9229.

Pannus fibrosis of vernal conjunctivitis, indicating the superficial opacity usually seen in the upper corneal limbus.

Stages of pannus; Parsons Pathology, vol. 1, p. 197, and Amer. Ency. Ophth., p. 9229.

K. punctata superficialis—Fuchs; Wien. klin. Woch., 1889. Allied to herpes febrilis corneae without vesicles.

K. subepithelialis centralis—Adler; similar to above, Cent. f. Aug., xiii, 1889.

K. maculosa—Reuss; similar, Wien. klin. Woch., 1889; Parsons Pathology, p. 202.

K. Bombay—Herbert; Ophthalmoscope, Jan., 1904.

Westhoff's and Kirkpatrick's disease (named by Elliot); Tropical Ophthalmology, 1920, p. 321.

K. punctata subepithelialis—Gradle; Arch. of Ophth., Sept., 1911.

K. nummular—Stellwag; similar, Wien. klin. Woch., 1889; Parsons Pathology, p. 202.

K. sand blast, a synonymous term used in Fox's text book, 1904.

K. superficial linear—Spicer; Ophthalmoscope, March, 1916.

K. alphabet (buchstaben)—Haab: identical with above, Beit. zur Augenheil., June, 1916.

K. diffusa and catarrhalis—Myashita; abs. Oph. Y. B. xv, p. 69.

K. flame-shaped marginal epithelial—Spicer; Tr. O. S. U. K. xxxii 1, p. 386. A superficial, gray, raised, flame-shaped opacity, starting at the limbus and reaching more than one-third across the cornea. Fluorescein slightly stains. The patient was a cook, and heat was thought to be a factor.

K. marginalis periodica fugax—Attias; Archivo di Ottalmol. xxi 1, 1913. A most unusual opacity is described as forming in the upper part of the superficial layers of the cornea. Beginning with a nebulous area, it later developed into a band 2 mm. within and parallel with the limbus for one-third its circumference. There was a superficial vascularity over the opacity. Attacks occurred for many years in the Spring at intervals of 15 to 25 days and lasting for 24 to 36 hours. There was pain and redness with diminished sensitiveness after the attack. It is probably allied to some of the types described under k. punctata superficialis.

K. vesiculosa marginalis—Gradle; A. J. O., iii,p. 519. The formation of a succession of large subepithelial vesicles near the limbus with subsequently an annular opacity beneath, ultimately involving two-thirds of its depth, is the substance of this unusual picture. The disease was bilateral, the beginning stage being represented in the right eye and the terminal stage in the left eye, with a dense opacity in the lower part of the cornea. It was the author's opinion that the vesicular contents absorbed and the uniform opacity beneath the vesicle was due to the toxins therein contained. The process repeats itself and the opacity increases in size. Cause undetermined.

Dellen—Fuchs: text book, a superficial corneal pitting 1x3 mm., probably a disturbance of innervation.

Gaule's pits; Arch. f. Oph. lxviii, p. 82, 1911, similar to above but smaller, centrally placed and pass away within a few hours.

K. neuroparalytica (nonulcerative), occurring in lesions of the Gasserian ganglion.

Anterior uveitis; Duane's, Fuchs' text book.

K. punctata syphilitica; Fuchs' text book.

K. punctata profunda—Fuch; Fuchs' text book; this term is suggested for the above.

K. interstitialis punctiformis specifica—Hoch; de Schweinitz' text book, 1920, p. 272.

K. punctata vera—Mauthner; de Schweinitz' text book, 1920, p. 272.

K. gummatosa—Re; abs. Oph. Y. B. ix, p. 146. A case 27 years after infection, with areas of infiltration with yellowish nodules projecting into anterior chamber.

K. nodular—Wicherkiewicz; abs. Oph. Y. B., 1906, p. 94. Described as a condition between k. punctata and k. gummatosa, usually seen in children who possess syphilitic stigmata.

K. interstitialis centralis annularis—Vossius; abs. Amer. Ency. Ophth., p. 6762.
K. secondary parenchymatous—Elschnig; Axenfeld's Lehrburch, 1920, p. 457, a monocular affection occurring secondary to iridocyclitis.
Gummatous infiltration of cornea—Elschnig; Axenfeld's Lehrbuch, 1920, p. 457. Occurring in connection with gumma of sclera and ciliary body, with a sector shaped area of deep corneal infiltration.
Salmon patch—Hutchinson; de Schweinitz' text book, 1920, p. 267.
K. anaphylactic—Wessely; abs. Amer. Ency. Ophth., p. 339, p. 6759.
Sclerosing k.—von Graefe; Parsons Pathology, p. 202.
K. profunda; Duane's Fuchs' text book, 1919, p. 299.
K. disciformis—Fuchs; text book, 1919, p. 276. K. M. f. A., xxxix, 1891. This disease is usually classified with ulcer serpens on account of its similar origin, that is an injury to the corneal epithelium. Inasmuch as there is rarely if ever a loss of corneal substance, and on account of its similarity to keratitis profunda, the classification is changed to the nonulcerative forms.
K. marginalis profunda—Fuchs; Duane's Fuchs' text book, 1919, p. 302.
K. pustuliformis profunda—Fuchs; Duane's Fuchs' text book, 1919, p. 302.
K. trypanosome; de Schweinitz and Woods, Tr. A. O. S., xv, p. 107.
Keratosis cornea—Matsuoka, Nippon Gank. Zasshi. Aug., 1917.
K. wasp-sting—Yoshida; abs. A. J. O., iii, p. 493.
K. melanite—Perrin; La Clinic Opht., Sept., 1919, a milky corneal infiltration occurring eight months after exposure to fumes of melanite. Recovery complete on withdrawal.
K. emetin—Trantas; Ann. d'Ocul., clvii, p. 444.
K. myxedema—Collins; Tr. O. S. U. K., xxvii, p. 203.
K. naphthalin—Caspar; Klin. Mon. f. Augenh., lix, 142.
K. punctata onchocercosa—Luna; A. J. O., i, p. 122, ii, p. 293, a superficial punctate keratitis due to activities of onchocerca volvulus, a filaria form nematode occurring in West Central America.
K. punctata—Sichel; Parsons Pathology, p. 349.
Mutton fat deposits—a term commonly used by English ophthalmologists to describe large precipitates on the posterior corneal surface.
Fädenformige (thread like)—Schirmer; Parsons Pathology, p. 182: allied types of striate keratitis are seen in the anterior layers caused by a wrinkling of Bowman's membrane in phthisiçö eyes, and are usually classified as reticular keratitis.
Traumatic lattice-form opacity—Caspar; Klin. Mon. f. Augenh., 1903, p. 289.
K. postica—a term used in Noyes text book in connection with k. punctata.
Traumatic keratalgia—Arlt; MacNab, "Ulcerations of Cornea," p. 19.
K. relapsing bullous—Nettleship, text book, p. 131, due to superficial injury.
K. nagel (fingernail)—Hensen; MacNab, "Ulcerations of Cornea," p. 19.
K. filamentosa—Leber; B. d. o. G. Heidleberg, 1882. Parsons Pathology, p. 183.
Degenerescence circuse—Gallemaerts; abs. A. J. O., iii, p. 538, a variety of k. lagophthalmus with a parchment like rolling of the corneal epithelium in the exposed palpebral fissure.
Photophobia infantum—a term used in Fox's text book, 1904.
K. eczematosus; often used synonymously with k. phlyctenulosus; but since all cases of k. phlyctenulosus are not necessarily of eczematous origin, k. eczematosus should have a definite heading.
K. frenular (snailtrack); Amer. Ency. Ophth., p. 6813, an irregular formation of phlyctenules.
K. tenulosa, Amer. Ency. Ophth., p. 6817, an obsolete term for k. phlyctenulosus.
Herpes corneae neuralgica—Schmidt-Rimpler; Weeks' text book, p. 286, accompanying the pain of a supraorbital neuralgia. Elschnig (Axenfeld's Lehrbuch, p. 433) likewise mentions herpes corneae due to focal infections in the teeth and sinuses.
Herpes cornea frebrilis—Horner, 1871; A vesicular keratitis occurring in herpes facialis.
Zona ophthalmica, Amer. Ency. Ophth., vol. vii, a synonymous term with herpes zoster ophthalmica.
K. dendritica—Horner, 1871, described a vesicular keratititis associated with facial herpes, 1884, named by Hensen.
Keratitis dendritica et ulcerans mycotica—Emmett; abs. Amer. Ency. Ophth., p. 3347.
K. malarial—Kipp.
K. furrow—Schmidt-Rimpler.
K. dumb-bell—Buxton; Ophthalmology, xiii, p. 450.
Keratite ulceruse en sillons etoiles, a synonymous term for dendriform ulcer used in de Schweinitz' text book, 1916, p. 250.
Infected marginal ulcer—zur Nedden; Axenfeld (MacNab) "Bacteriology of Eye," p. 3.
Small marginal ulcer (senile)—Fuchs; text book, 1919, p. 25.
Marginal ring ulcer, mentioned in de Schweinitz' text book, 1920, p. 250.
K. ulcerativa marginalis—Martin, W. A.; Amer. Ency. Ophth., p. 6822.
Marginal phlyctenular keratitis, de Schweinitz' text book, 1920, p. 242.

K. marginalis superficialis—Fuchs; Duane's Fuchs' text book, 1919, p. 260.
Rosacea ocularis—Troncoso, Arch. of Oph., xlvii, p. 1.
Ulcus rodens—Mooren.
Chronic serpiginous ulcer—Nettleship.
Ulcus serpens—Saemisch, 1870.
K. hypopyon—Roser, 1856.
Onyx, an obsolete term applied to an accumulation of pus between the layers of the cornea from an ulcer.
Abscess of cornea—Arlt.
K. atypical hypopyon and atypical ulcer serpens—MacNab; "Ulceration of Cornea," p. 77 and 104.
Ring abscess of cornea—Fuchs, Arch. f. Augen. lvi, p. 1, abs. Oph. Y. B., 1904, p. 82.
Keratomalacia—von Graefe.
Marantic ulcer, mentioned in Duane's Fuchs' text book, 1919, p. 261.
Internal corneal ulcer—von Hippel; Arch. f. Augen. lxviii, 1908, abs. Amer. Ency. Ophth., p. 3380, a destruction of Descemet's membrane from corneal or iritic disease.
Mustard gas purulent ring infiltration—Mayou; Tr. O. S. U. K., xxxviii, p. 148.
Sphincteralgic ulcer—Morax; Bull. de la Soc. Franç d'Oph., 1911, a name applied to a superficial ulceration with persistant pupillary contraction not yielding to atropin. Iridectomy relieves pain and cures ulcer.
Pannus degenerativus—Baas; K. Mon. f. Augen., xxxvii, 1900; Parsons Pathology, p. 196; occurring in degenerated, blind eyes such as result from cyclitis, glaucoma, etc.
Senile marginal atrophy—Fuchs; Duane's Fuchs' text book, allied to arcus senilis in that it always occurs in those cases.
Peripheral furrow keratitis—Schmidt-Rimpler, and Dystrophie marginale symmetrique-Terrien, are synonymous terms with the above, and are described in detail in Parsons Pathology, p. 248.
Nodular opacity—Groenouw; Parsons Pathology, p. 245.
Guttate opacity—Fuchs; Duane's Fuchs' text book, 1919, p. 312.
Drüsen formation of Bowman's membrane—Roemer's Lehrbuch, 1919.
Lattice-shaped opacity (gitterige k.)—Haab; Parsons Pathology, p. 247.
Corrugation of Bowman's membrane—Byers; A. J. O., iii, p. 716.
Family punctate degeneration—Fehr; abs. Amer. Ency. Ophth., p. 3364.
Interstitial punctate opacity—Gunn.
Calcareous degeneration—Dixon, 1848. Various names subsequently given, see Parsons Pathology, p. 243.
Zonular opacity—Fuchs.
Progressive interstitial calcareous degeneration—Axenfeld; abs. B. J. O. vi, p. 64.
K. vesiculosa et bullosa—Fuchs; Duane's Fuchs' text book.
K. bullosa, a term used by Meyer, text book; the older writers used the word pemphigus for bulla.
Atheromatous ulcers—Fuchs; Duane's Fuchs' text book; ulcers developing in old corneal cicatrices.
Sequestrating scar k.—Wintersteiner; synonymous with the above.
Dystrophie epithelialis corneae—Fuchs; Duane's Fuchs' text book, 1919, p. 261.
Peripheral pigmentation of cornea; Axenfeld's Lehrbuch, 1920.

DESTRUCTIVE TUBERCULOSIS IN THE EYE OF A CHILD.

HIRAM R. STILWILL, M.D., F.A.C.S.

DENVER, COLORADO.

This case of obscure ocular disease destroyed the function of the eye and led to enucleation. The pathologic examinations demonstrated the tuberculous character of the lesions. Read before the Colorado Congress, July, 1921.

Acute tuberculosis occurring in the eye of a child so young (four years) is extremely rare. It is said to occur more often between the age of five and twenty-five, (de Schweinitz) the average age being twelve years.

The case reported began as an iritis or iridocyclitis, later involved the sclera and cornea, taking on a confluent or conglomerate form, and resulting in rapid destruction of the eye in a comparatively short period of time, some seven weeks from its onset.

CASE. David H. age 4 years, American, was first seen on June 6, 1921. The following history was obtained. His mother stated that she first noticed a redness of the right eye, about three weeks before, which she attributed to a "cold." There had been no injury to the eye and no secretion had been noticed. He had not complained of pain or discomfort, and had not been ill. He is the youngest of four boys, and has always been healthy; has had no illness. The family history is negative. Both parents living and well and no history of T. B. on either side is obtainable. Physical examination by the family physician was reported negative; and no enlarged tonsils or cervical glands were noted.

Examination revealed a moderately congested right eyeball, more marked in the ciliary zone. The cornea was clear, anterior chamber deep and the aqueous somewhat cloudy. The iris appeared dark brown in color (the left iris being light blue). The pupil was contracted, fixed and irregular, with a grayish white exudate in the pupillary area. The tension was normal and there was no bulbar tenderness. Vision was reduced to hand movements. The left eye was normal.

On June 8th Dr. Ward Burdick, who examined the blood, reported a negative Wassermann. The spinal fluid was not taken. The von Pirquet skin test for T. B. was pronounced "mildly positive." Instillations of atropin had no effect whatsoever on the adhesions.

The patient was seen frequently during the succeeding ten days, during which time several small grayish white deposits appeared in the stroma of the iris near the pupillary margin, and small blood vessels were seen running thru it. The anterior chamber became more shallow, the cornea infiltrated and uniformly hazy without vascularity. At the end of three weeks the sclera near the limbus on the nasal side became bluish in color, and an ectasia 3 to 4 mm. in width involving the nasal half of the sclera presented. The tension was now recorded as minus. During this time the patient did not complain of pain or discomfort and except for a slight languor was apparently quite well.

As the eye was rapidly becoming destroyed, its removal was strongly advised, but consent was not obtained until July 6th, when enucleation was done.

Report submitted by Dr. Philip Hillkowitz, Pathologist at Mercy Hospital:

Naked eye appearance. "Right eye, ectasia at limbus involving inner half of globe."

"Microscopic examination: "Sections thru iris show on either side of the stratum pigmentosum a band of tissue, in which are seen many tubercles with characteristic giant cells of the Langhans' type, epithelioid cells and small round cells, as well as foci of caseation necrosis. Diagnosis: Tuberculosis."

Report of Dr. Wm. C. Finnoff:

After removal, the eye was fixed in formalin solution.

Macroscopic appearance: The submitted specimen had been cut meridionally and a large V-shaped piece of cornea removed. The remaining cornea was pushed forward by a collar like ectasia

in the region of the limbus. This portion of the eye was markedly thickened. A yellowish white exudate rested on the anterior surface of the iris, and almost completely filled the anterior chamber. The lens was not present. The retina was detached from the choroid. This probably occurred during fixation and opening of the globe.

Time did not permit of proper embedding of the globe, and only half of the eye was sectioned. This corresponded to the portion from which the cornea had been removed to prepare frozen sections. Celloidin embedding and staining with hematoxylin and eosin.

Microscopic findings: The anterior portion of the section, corresponding to the region just posterior to the limbus, is made up of a mass of lymphocytes, endothelial cells, giant cells of the Langhans' type, serous exudate, and necrotic material. This is covered externally by a thin layer of subconjunctival tissue, which contains conjunctival vessels. The mass is 3 mm. in thickness. In this area, the sclera has been replaced by a granulomatous mass, and no trace of scleral bundles can be found. The circular and radial muscle bundles of the ciliary body are entirely destroyed, and only phantom processes of the ciliary body are seen in the center of the mass. These consist of a wavy line of pigment granules, which are left in the wake of pigment epithelium, which has degenerated. Internal to the line of pigment granules, a cyclitic membrane has invaded the vitreous. This mass is typically granulomatous, and contains giant cells and necrotic material. The cyclitic mass extends backward, almost to the ora serrata. A thin layer of broken down scleral bundles, corresponding to the external layer, is first noted opposite the posterior 1/4 of the corona ciliaris. Here the bundles are separated by cellular exudate and giant cells. Opposite the beginning of the orbicular ciliaris, the sclera is of a normal thickness and is not involved. Ciliary epithelial cells are first seen opposite the posterior 1/4 of the corona ciliaris. At the ora serrata, the retina is invaded by a few small round cells. The vitreous in this region contains fibrin and scattered endothelial cells. The endothelial cells are gathered in clumps, varying from 2 to 5 or 6 cells in thickness, on the inner surface of the retina, in the region of the peripheral retinal blood vessels. The nerve fiber and ganglion cell layers of the retina are slightly edematous. The retina was partially detached antemortem, as is indicated by a thin layer of fibrin and newly proliferated epithelial cells, which contain a few pigment granules. The layers of the choroid are widely separated by a serous exudate in its anterior half. This is especially marked in the outer portion, where the suprachoroidal space is distended to a marked degree. The optic nerve, cornea, and iris are not included in the sections cut.

Time did not permit staining for tubercle bacilli.

Diagnosis: Tuberculosis of the ciliary body, with extension thru the globe.

ASTHENOPIA WITH TUBERCULOSIS.

ALEXANDER C. MAGRUDER, M.Sc., M.D.

COLORADO SPRINGS, COLORADO.

This paper contains an analysis of 184 cases in tuberculous exsoldiers. It gives the relative frequency of the different symptoms with practical points bearing on the clinical management of these cases. Read before the Colorado Congress, July 30, 1921.

The term asthenopia is derived from the word "asthenia," meaning a general debility or depression of vital power, weakness, or lack of resistance. The Greek word *sthenos* means strength while *asthenos* means, of course, the reverse of strength, or weakness, while the ending of the word "opia" relates to the eye. Thus we have "Asthenopia," meaning weakness of the eyes, not disease; and this I want to limit further to asthenopia in the tuberculous, and still further to asthenopic symptoms as shown in 180 tuberculous soldiers, who have been referred to me, complaining of their eyes, and in four young women, all between the ages of 20 and 35, in whom a positive diagnosis of pulmonary tuberculosis had been made. The longest definitely known time that any of these patients had tuberculosis is three years.

All were refracted under homatropin hydrobromat and painstaking retinoscopy done. This was checked in every instance at the trial case and in each instance a postmydriatic refraction was done after the accomodation was fully restored to normal—this restoration usually required 48 hours. I want to say here that refraction in young adults and especially in the tuberculous without a mydriatic is useless in most cases, no matter how carefully it is done, and the oculist is wasting his and the patient's time when it is done any other way. Many of these cases had been previously refracted without a mydriatic. In only one case of the 184 was the strength of the cylinder changed, and I am not sure I was right in changing that. In only 2 cases was the strength of the spherical correction decreased more than one quarter of a diopter, and in these two the decrease was only a half diopter. I tell you this to impress how much more reliable is a refraction carefully done under a mydriatic than when the patient's manifest refraction is relied upon.

The tubercular patient is greatly dependent on his eyes for contentment, and a contented tuberculous patient stands the best chances of recovery. I might say he is more dependent on his eyes than on any other organ, because if a tuberculous patient can use his eyes with comfort, more of his time is spent in reading, study, or occupational therapy, which will take up his time and prevent hours of the introspection so detrimental to this class of patients.

When an exsoldier with tuberculosis is referred to me for an examination of the eyes, I could almost write out his symptoms before he has told me of any of them, hand him the list and he would make very few corrections. Nearly all of them complain of blurred vision for sustained close work, the eyes tiring very easily on use for a short time, the time varying from five minutes to half an hour. This is accompanied or followed by headaches and pain in the eyes. A smaller percent complain of photophobia, lacrimation, and epiphora.

In the March issue of the AMERICAN JOURNAL OF OPHTHALMOLOGY, page 218, Dr. Edward Jackson has written an editorial which is so appropriate to the subject in question, that I take the liberty to quote liberally from it. In the first place he gives MacKenzie's definition of asthenopia as "that state of vision in which the eyes are unable to sustain continued exercise upon near objects", without other evidence of disease, and tells us that many cases were removed from this class by Donders' observations regarding hyperopia, astigmia, and presbyopia. Jackson further says: "It may now be held to include only those unable to use their eyes for more than a very brief time without pain, altho the eyes are without recognizable ocular conditions to account for this disability."

If we confine asthenopia to those cases in which no cause can be found for the

symptoms complained of, there would be only a few cases of true asthenopia left in this series. I think Donders is wrong in this. I would agree with him if he would include those low refractive errors which, in normal health, produce no symptoms; but which, as soon as the subject comes down with some asthenic conditions, manifest themselves. And this is exactly what does happen in tuberculous subjects whose whole system is affected by the toxins of tuberculosis, which infection may have been going on for years. In these cases reported to you to-day the time of known inrection has been from 2 to 36 months; yet in some, if not all, the disease must have existed for a much longer time—probably years before going into service.

Jackson says: "The importance of asthenopia has frequently been forced upon the writer by the extreme cases that occur among patients suffering from pulmonary tuberculosis, involving lesions of considerable extent; but generally with rather good systemic resistance. Such patients sometimes have marked errors of refraction, and sometimes very slight ones; but no evidence of ocular disease. In either case they complain of very slight inaccuracy in their correcting glasses, and appreciate some diminution of suffering from slight rectification of their lenses. But they never get anything like complete relief from their pain and disability, and under the best possible conditions cannot use their eyes anything like so much as they wish. With recovery from the tuberculosis, they become free from asthenopia, and may discard glasses on which they were before entirely dependent." I do not agree with Dr. Jackson in his statement that, "They never get anything like complete relief from their pain and disability"; but I do agree in the main that "under the best possible conditions they cannot use their eyes anything like so much as they wish." All but one of the cases tabulated got relief from their symptoms. That one's complaint was, that before he was refracted telegraph poles and corners of buildings and rooms slanted to the right. He had a refractive error which required for the right eye +0.50⌒+0.25 C. Ax. 35° and for the left eye +0.25⌒+0.50 C. Ax. 140°. With these he complained that things "tilted" just as much as before; but the opposite way. I then changed the cylinder axis and finally got him to the point where he said there was only 1/8 of an inch difference between the upper and lower edges of a book and this bothered him. I then got Jackson's article on asthenopia and read to him the following after which, appealing to his intellect, he had no further trouble.

"A good intellectual appreciation of the essential basis of asthenopia, and the difficulties of removing it, should be followed by a frank discussion of the situation with the patient. These patients have generally been disappointed so often that they are not much disturbed by the lack of any promise of quick and easy relief; and nothing but the patient's intelligent, persistent cooperation, in living and working along the lines indicated for his or her particular case can ever effect a cure."

I will discuss the asthenopic symptoms of my series in order of their frequency.

First. 86, or 48.6 per cent, had hyperopic astigmia. The astigmatic error was in the large majority of cases very small, being a+0.25 or +0.50 D. S ⌒+0.25 or +0.50 C. Ax. usually 90°. Those cases requiring a high hyperopic or myopic astigmatic correction are not included in the series. It is very plain to me that these low errors manifest themselves and produce symptoms in patients when they succumb to some asthenic condition involving every part of the body, like pulmonary tuberculosis, while the same error may have existed for years without any discomfort as long as the patient was in ordinary health.

Second. 48.3% had muscle imbalance. There was either esophoria, exophoria or hyperphoria. In no case was diplopia complained of, and with one or two exceptions the muscle imbalance was well within what may be considered normal for distance, viz. one or two degrees. In no case was a prism prescribed. In a few cases muscle exercises were given. Personally, I am opposed to prisms, except in cases of hyper- or hypophoria.

These cases, as a rule, should be corrected by suitable prisms, base up or down as the case may require. Needless to say, the smallest error of refraction was corrected by lenses in these cases. In many cases no muscle imbalance could be detected after the correction was put on and in two cases the muscular error was increased.

The third symptom in order of frequency was frontal headache. If headache was taken as a whole, it would stand first on the list, there having been a total of 102 cases where some kind of headache was an important symptom; but I have preferred to divide headaches into frontal, temporal and occipital and find, 78 frontal, 12 temporal, and 12 occipital. These frontal headaches were carefully examined with reference to the relation that any accessory sinus involvement might have to the pain; but only in ten of the cases was an accessory sinus found involved. In these ten, there was tenderness on pressure over Ewing's point.

Please allow me to say, in parenthesis, that no comprehensive investigation of headache is complete without a thoro investigation of the nasal accessory sinuses and those of you who are interested in this particular subject will find Sluder's book on "Headache and Eye Disorders of Nasal Origin" of inestimable value.

Fourth. Sixty seven, or 36.4% of these tubercular patients, complained of blurring vision for close work. Acute vision is the ability of the eye to observe the shape, form, color, and size of an object. The clearest image of an object is obtained when a person looks directly at it. The rays of light then fall on the retina at the macula lutea. The acuity of vision is tested both for distance and for the near point. This blurring is nothing more than the relaxation of a weak, overworked, tired ciliary muscle after a concentrated effort to produce the clearest image possible. In hyperopes the ciliary muscles is usually very much more highly developed than in myopic eyes, and in these hyperopes of mild degree we more often find distress from blurring vision than in the myopes, who have not been accustomed to sharp and distinct impressions. The stronger ciliary muscle of the hypermetrope takes on the same debility encountered elsewhere in tuberculous patients and manifests the fatigue by blurred vision, just as the muscle of an arm or leg manifests itself in the sensation of being tired or in pain.

Fifth in frequency, is pain in the eyes —50 cases, 27.1%. As Jackson has pointed out, pain is not to be measured— "We have no common unit for suffering: No objective method of observing it except by the evident effects it produces on the sufferer." This pain is described as sharp or dull, constant or intermittent, stinging or burning. It is usually in the front of the eyes, occasionally "behind the eyes" and frequently "the eyeball pains" and "is sore to the touch." Sometimes the sensation of sand in the eyes is the only symptom which makes the patient seek the services of an oculist. In these latter cases the pain is usually of nasal origin. With none of these patients was the pain so great as to keep them awake. It most frequently come on after 10 to 30 minutes use of the eyes for close work, whether reading, painting, doing bead work or whatever required sustained effort upon near objects.

Sixth—Inflamation, 35 or 19%. This is most frequently seen as a mild conjunctivitis or congestion, which is made worse on use of the eyes for close work.

Seventh—Burning and itching was the chief complaint in 29, or 15.7%; but was usually associated with blurring of print, headache and epiphora.

Eighth—Epiphora, 11.9%, 22 cases.

Ninth—Photophobia, 9.2%, 17 cases.

Tenth—Tired feeling, 7.6%, 14 cases.

Eleventh, Simple hyperopia occurred in 13, or 7%.

Twelfth, Dizziness in 7, or 3.8%.

Thirteenth, Poor distant vision in 6, or 3.2%.

Fourteenth, Twitching of lids in 6, or 3.2%.

Fifteenth, Simple myopia in 2, or 1%.

Sixteenth, Hordeola 4, or 2.1%.

For many years I have urged among my colleagues, the careful refraction of all tubercular patients. In a paper last

year I briefly mentioned "The nontuberculous eye of the tuberculous patient." I said then, "The third heading of this subject is an uncharted sea so far as concerns any recorded observations of ophthalmologists."

It has been known for many years in a general way, that a patient's eyes should be made as nearly emmetropic as possible. Probably not more than 1% in health or disease are emmetropic. Many of the ametropic conditions are taken care of without headaches or other manifested symptoms, and the person goes thru life unconscious of an error of refraction. With others, however, a very small astigmatic error may be the cause of all sorts of asthenopic manifestations. Gould of Philadelphia goes so far as to say that eyestrain may even cause tuberculosis. While I do not feel justified at this time in making so bold a statement, yet I know that eyestrain causes many ills; and that the life of the bedridden tuberculous patient may be made much more comfortable if his eyes are in such condition that his time may be partly occupied by their use without conscious or unconscious strain. There can be no harm in reading in bed if the light is properly placed, the patient lying in the proper position and the book on a suitable stand, so that the muscular effort of the arms holding the book does not exhaust the patient. Indeed a definite course of reading could be mapped out suited to the individual that would so engross him and occupy his time, that the mind building as well as physical building could go on at the same time. I have seen many porch patients lie day after day with a black cloth or shade over their eyes to shut out the bright sun light; when a turn of the bed, a pull of a curtain, amber glasses, or a correct refraction would convert them from sour, melancholy, depressed, introspective individuals to cheerful patients with a new lease on life.

In none of these 184 cases was any pathologic condition found to account for the symptoms. I have thought at times that there was to be found in eyes of these tuberculous patients a disproportion in the size of veins and arteries of the fundus—giving the impression that the veins are larger than they are in health; but a careful study and comparison has failed to convince me that the relative size is other than normal.

OCULAR SYMPTOMS OF EPIDEMIC ENCEPHALITIS.

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The ocular symptoms of epidemic or lethargic encephalitis are of great importance. They are often loosely observed and poorly reported. Accurate reports of them are still needed. In the two cases here given, special attention has been devoted to their observation and recording. Read before the American Ophthalmological Society, June 15, 1921.

The ocular symptoms met in encephalitis are sufficiently striking to have attracted attention from the first. In the earlier reports of cases, frequently references can be found to ptosis, diplopia, socalled strabismus, and mydriasis, with an occasional note concerning the pupillary reactions, but very often the record is rather vague. Even in otherwise well worked out case reports, the writers too often have been content with indefinite statements as to the conditions of the muscles supplied by the third nerve, without making clear the exact branches involved and the degree of involvement of each. Yet the pareses and paralyses of the ocular muscles met with in this disease present some curious features which seem to me to deserve careful study.

These features are brought out thus in Tilney and Howe's summary of the ocular findings: Rarely clearcut complete paralysis of any one oculomotor nerve. The paresis is usually partial and involves more than one, or only part of one neuromuscular group. Ptosis is the most common isolated ocular finding. The disturbances are very frequently bilateral. Unilateral or bilateral paralysis of accommodation, dissociated from pupillary involvement, may occur. The palsies frequently are not stationary, but may change from day to day. I would add to this that the change may be even more frequent. Lesions of the fundus are usually absent, but there may be a slight degree of papilledema.

It seems to me that for the purpose of gaining what assistance we can from the ocular symptoms in making the diagnosis of this disease, the clinical pictures presented need to be studied with reference to the grouping of the symptoms in the individual cases in which ocular symptoms are present. It seems pertinent to inquire whether the successive pareses of muscles supplied by the third nerve do, or do not follow any order, whether any one of these muscles is apt to suffer first, and whether any one of them is more likely to suffer a greater degree of paresis than the others. The onset of the paresis appears to be gradual in some muscles, sudden in others; the palsy of one muscle may be fleeting, while that of another, perhaps supplied by the same nerve, is camparatively stationary. Whether any constant relation between these peculiar facts can be discovered seems worth consideration. So do the relations of the pupillary reactions, and of the condition of the accommodation, to the other symptoms.

Dr. Holden has recently made a very valuable contribution to this subject in his masterly analysis of the ocular manifestations in 100 cases of this disease. No one can say that these cases were not carefully and accurately observed and recorded. As a statistical study of the frequency with which the optic disc, the levator palpebrae, the individual extrinsic muscles of the eyeball, the pupils, the accommodation, and the facial nerve are affected, nothing better could be asked. As a study of the possible explanations of the conditions observed, the paper is excellent. But there is lacking information as to the clinical grouping of these symptoms in the individuals affected which might act as a guide to the clinician, and help him to recognize the disease in an early stage. Yet the importance of such information is recognized in the final sentence, which reads: "Since the eye disturbances of encephalitis are sometimes of early onset, and then the most annoying of the patient's symptoms, the ophthalmologist may be the first physician to be consulted, and in times of epidemic he may from the symptoms alone, if lues can be excluded, make the diagnosis." Apropos of this, it may be remembered that in two of the

seven cases reported to this Society by Dr. Woods in 1919 the ocular symptoms were the first to appear.

Such a study as the one indicated above can be made profitably only after the symptoms presented in a great many cases have been accurately observed, recorded, and published. Reliable data must be accumulated first of all; and it is for the purpose of making a slight contribution to the collection of such data that I wish to record my observations in the two following cases.

The first case is that of a man, 46 years old. Dr. Fairfax Hall, who had the care of the patient, has kindly placed his notes at my disposal, and it has seemed wise to quote rather liberally from them. When first seen, January 19, 1921, the patient said that for four days he had been dizzy, unable to sleep, troubled with diplopia, and suffering a constant pain with exacerbations down the outside of his right arm. Some months before he had received a blow on the head which rendered him unconscious, and since then he had not perfectly regained his strength, consequently a progressive lesion in the brain resulting from that blow had to be excluded before a diagnosis of epidemic encephalitis could be made.

Large doses of bromid, chloral, and codein failed to give him any sleep the following night. In the morning his temperature was 102° F.; systolic blood pressure 140, diastolic 100; neck slightly stiff; pupils contracted; some reflexes diminished, others increased, others normal; no paralysis, but the right arm was weak, stiff, tremulous, and painful; the left eye turned in, but moved past the middle line in looking to the left. The left arm also was somewhat painful. Lumbar puncture showed a very slight increase in pressure; clear fluid; 4 cells per ccm., 100% lymphocytes, moderate increase in albumin, moderate amount of globulin, moderate reduction by Fehling's solution, negative Wassermann with both cholesterinized and plain alcoholic extract antigen. The white blood count was about 8000, 68% polynuclears, 25% lymphocytes, 4% mononuclears, 2% eosinophiles, 1% basophiles. Blood Wassermann negative. The urine contained a faint trace of albumin and a few hyalin and small finely granular casts.

I saw the patient on the afternoon of the 22d. He seemed to be rational and willing to help, but sleepy. The sleepiness was ascribed to the large amount of hypnotics which had been administered. The pupils were very small, about the size ordinarily seen after instillation of pilocarpin, approximately 1 mm. in diameter. They reacted quickly tho slightly to light, but did not respond to accommodation. The left externus was paretic, but not paralyzed. The eye turned in distinctly while at rest, but when the patient looked to the extreme left, it would pass the middle line and then lag along more and more slowly to a point about midway between the median plane and the outer canthus. Both inferior recti were paralyzed, neither eye could turn down below the horizontal plane. This paralysis had appeared since the morning visit of Dr. Hall on the same day, as he had tested the rotation of the eyes at that time and observed both eyes to turn downward. The upward rotation of both eyes, the lateral movement of the right, and the inward movement of the left were normal. The patient had a myopia of 18 to 20 diopters, and was not inclined to open either eye widely until after he put on his correcting glasses; then a slight ptosis of the left upper lid was evident. Its margin was lower than that of the right, but did not encroach on the pupil. Thus there appeared to be a partial loss of function of the left abducens and, to a less degree, of the left levator palpebrae, with a total loss of function of both inferior recti, the appearance of which was sudden.

The response of the contracted pupils to homatropin seemed to be a little more prompt than usual. There was no haziness over the left retina or papilla, and the vessels seemed to be normal, except that they all bent at the margin of the papilla and then ran smoothly to the center, as tho either rising to the summit of an elevation or passing down the gradual incline of an excavation. No markings of the lamina cribrosa could be seen, while the vessels at the point where

they turned to enter the nerve seemed to me a trifle more distinct with a lens one diopter weaker than was needed to render the vessels in the retina clear. I do not pretend to be able to measure accurately with the ophthalmoscope slight differences of level in high myopia. Had the case been one of emmetropia or hypermetropia, a positive statement that the center of the disc was above the level of the surrounding retina would have been justified; but as the case was one of high myopia, and as there was no confirmatory haziness, I can only record the observation as made. The right papilla showed no such change in the courses of the vessels; the fundus appeared to be normal except for an ordinary myopic conus.

The next day the patient slept almost continuously and was somewhat irrational when aroused. The paresis of the ocular muscles had become more marked. The left eye had almost no power of movement except inward, while in the right the only muscle which seemed to function properly was the externus. The relative degrees of paresis of the individual muscles could not be determined. The skin was cyanosed. There was no paralysis of the muscles of the limbs, but the hands and arms were weak with a constant tremor which was increased by movement. A careful study of the reflexes showed some to be increased and others diminished in a confusing manner which suggested multiple lesions in the cortex, corpus striatum and nuclei. Any single progressive lesion referable to the blow on the head was excluded and the diagnosis of encephalitis made.

The patient lay in a lethargic state for five days and then began to recover. On the 28th his pupils were moderately dilated, reacted sluggishly to light, but not at all to accommodation. The movements of the eyeballs were limited in all directions except to the right.

On February 2d the ptosis was almost gone and all of the other extrinsic muscles appeared to have wholly regained their functions, with the exception of the left externus. The left eyeball no longer deviated, but its outward movement was slightly restricted. The pupils were of medium size and reacted promptly to light, but not to accommodation. The general condition was improved. As convalescence progressed, the patient learned that he could not read with his glasses, as had been his habit; this difficulty gradually became less.

The myosis in this case may be ascribed reasonably to the large doses of hypnotics, including codein; but it may be susceptible of some other explanation as it does not appear to be uncommon in this disease. The pupils reacted to light promptly at all times, except when under the influence of homatropin, but at no time did they respond to accommodation. Convergence was present, for the eyes seemed to fix on the finger held near them, altho the pupils did not contract. Later the accommodation proved to be paralyzed. Several cases have been reported in which the pupils responded altho the accommodation was said to be paretic or paralyzed; this case differs as the loss of function was accompanied by the usual loss of pupillary response. Yet, as Dr. Holden has suggested to me, an absence of the pupillary response to convergence is not uncommon in high myopia.

The second patient was an Italian, 44 years old, admitted to the New Rochelle hospital February 28, 1921. He had been suffering fifteen days from dizziness, headache, and pain in the back of the neck. On admission he lay apparently asleep, responding when spoken to sharply, but dozing off again at once, not restless and seeming to have no pain. The intern noted that his pupils reacted to light and accommodation, and that his left upper lid drooped.

On March 4th there was a slight ptosis of the left upper lid, not encroaching on the pupil, and paresis of the left superior and inferior recti, causing the eye to lag behind when the patient looked either up or down, with all other movements of both eyes normal. The pupils were of normal size, reacting promptly to both light and accommodation. The patient was very restless and made much resistance to the examination.

The next day the ptosis of the left

upper lid was more marked, the paresis of the left superior and inferior recti was unchanged, but the left internus was totally paralyzed. The left eye stopped at the midplane when the patient looked to the right. The functions of the other muscles appeared to be intact. No pathologic change in the fundus.

On the following day the paralysis of the left internus and the pareses of the inferior and superior recti had completely disappeared, the movements of the eyes in all directions seemed to be normal, and the ptosis of the left upper lid was less.

Three days later there was no ptosis and no limitation of the movements of the eyeballs in any direction. The patient looked and felt much better. After an uninterrupted convalescence he was discharged from the hospital apparently well.

About ten days later he was readmitted with the history that since discharge he had had several fits of drowsiness. Several more days elapsed before I was again summoned. The patient was then awake, rational, apparently in good condition, with no signs of ocular trouble. The bedside notes showed that an inequality of the pupils and a ptosis had been noticed three days after readmission, both of which had quickly disappeared, and the nurse said that she had frequently observed a ptosis, which was sometimes partial, sometimes total, and diappeared in a short time. The occurrence of the ptosis seemed to her to be a precursor of an attack of drowsiness. Nothing else was noted about the eyes tho the patient gradually sank into a state of complete lethargy.

On April 16th he could not be roused, but lay apparently asleep with both eyes closed. When the lids were raised, the eyes were seen to be looking straight forward, not turned upward as is usual in sleep, and not deviating in any direction. Whether this position was due to an absence of any paresis, or to total paralysis of all the muscles, could not be determined. The left cornea was much more sensitive than the right. A wisp of cotton drawn across the left cornea caused the patient to try hard to close the eye and to turn his head; when drawn across the right a much less effect was produced. The pupils were of medium size and responded by dilatation to pricking of the skin over the malar bone. There was little reaction to light.

On the following day the pupils were dilated, did not respond to light, and the dilatation was only slightly increased by pricking the skin over the malar bone. The right cornea was almost if not quite insensitive, while the left was clearly sensitive. Nothing abnormal was observed in the fundus. No further change was observed until the patient's death a few days later.

The very fleeting nature of all the ocular symptoms in this case is most striking. The observation of the nurse that the appearance of a ptosis seemed to be a precursor of an onset of drowsiness seems to me to be worthy of note. The other symptoms seem to have been of a like fleeting character, as they disappeared so completely, and the patient felt so well, that he was discharged from the hospital as cured of a disease which soon reasserted its presence and then went on to a fatal termination. Insensitiveness of the cornea may have been observed before, but if any record of the kind has come my way it has been overlooked. In this case it seemed to have been a late symptom, and its probable diagnostic value cannot be said to be great.

MELANOSARCOMA OF THE CHOROID.

Louis Levy, M.D.

MEMPHIS, TENN.

This case was under observation eleven months before enucleation of the eye, and eight months afterward. The detailed report of pathologic examinations of the tumor is included. Read before the Memphis Society of Ophthalmology and Oto-Laryngology, September 13, 1921.

Mrs. J. W. W., first seen December 15, 1919, giving the following history: For past two years severe headaches. On the 9th, first noticed a spot on left eye and upon closing right eye could not see well out of left. No pain, and until this time she did not know the eye was giving trouble, altho previous history elicits the fact that a year ago last October she had a spell with her stomach, and during this time she noticed a white cloud before the left eye. As she expressed it, like seeing the tips of a wing of a pigeon.

Examination. R. Vision 20/200, corrected to 20/20 with a +3.50 ⊂ +0.75 cy. axis 180°. L. 5/200, corrected to 20/65—1 with a +3.50 ⊂ +1 cy. axis 30°. With the ophthalmoscope R. fundus normal. L., to upper nasal side, detachment of retina extending to edge of disc and one-half way towards temple region. Few vitreous opacities. Vision from temple and lower side of retina normal. Transillumination at this time, light reflex thru pupil without a shadow.

Diagnosis at this time, detachment of retina. Advised K. I. and rest, and on December 26, detachment seemed less. Vision the same. On March 16, about the same. On April 15, 1920, detachment seems a little lower over disc. Vision now unimproved by glasses. Fingers two feet only. July 7, again seen, no difference in detachment and vision now with a +4. ⊂ +1. cy. axis 180° equal 20/100 +.

Patient not seen again until November 9, 1920, at which time stated had been sick for the past three months, having been out of city. Vision now a questionable perception of light. Finger tension seemed slightly higher, altho with the Gradle tonometer it was twenty millimeters, and with McLean twenty-eight in both eyes, and can now see a distinct dark shadow typical of a tumor. After consultation I advised enucleation. Was seen by Dr. Ellett, who agreed to the diagnosis and also advised enucleation.

On November 29, enucleation, from which patient made an uneventful recovery.

Last seen July 23, 1921, and has had no further trouble.

Macroscopic. Completely filling half of the posterior chamber of the eye is a roughly spherical tumor mass 11 mm. x 15 mm. x 12 mm. The tumor apparently originates from the equatorial zone of the choroid layer. The retina is completely detached and covers the tumor portion which pushes into the posterior chamber. The center of the tumor, which grossly appears solid, is a light grey in color with a peripheral zone which merges gradually from a sepia to a dark brown as the outer edge is reached. The pigmented zone, however, is well limited from the gray zone. It measures 1 mm. to 3 mm. in width. The lens is pressed forward so that the angles of the anterior chamber are blocked. The cornea is turbid. There is no gross infiltration by tumor of the sclera. A colloid like material appears to have detached the remainder of the retina from the posterior chamber wall, so that the retinal layers of both sides of the fundus lie parallel to one another in a line extending between the lens and the optic nerve.

Microscopic. The tumor is a uveal tract tumor arising from the choroid. It is made up entirely of uniform sized round and polymorphous cells 7 to 10 microns in diameter; the nuclei are round, small, and well stained and are surrounded by a rather dense cytoplasm which stains well. Teased specimens were not examined; the cells, cut in various planes, all appear uniform in shape and size.

The cells are arranged in a suggestion of cords and columns with no gland like lumina. Separating the columns is a very delicate connective tissue stroma. Sparsely distributed between these cell columns in the connective tissue reticulum are blood spaces appearing often as clefts lined by endothelium, which in turn is frequently bounded directly by tumor cells.

The greater portion of the tumor is unpigmented. The peripheral zone, however, is deeply pigmented. This pigment shades off gradually in amount as the central portion of the tumor is approached. The pigment in the lighter areas appears as delicate granules located in the cytoplasm of the tumor cell. In the peripheral portions, the pigment is so dense that the granular form is lost and the individual cell structure is blotted out. No chromatophores, differing morphologically from the tumor cells, are seen.

There are no multinucleated nor giant cells. The tumor appears to be of relatively slow growth; no mitotic figures are found. There are no areas of necrosis; no cholesterin crystals. There are no specific degenerative changes; no hemorrhage, no calcification. The iron reaction is absent.

Lying between choroid and the detached retina or portions of the fundus not occupied by a tumor, is a colloid like material, probably a product of choroid secretion.

Diagnosis. Melanosarcoma of choroid of eye. I am indebted to Dr. W. H. Burmeister of Chicago for the findings in this case.

MEIBOMIAN SEBORRHEA.

H. W. Cowper, M.D., F.A.C.S.

BUFFALO, N. Y.

Abnormal conditions of the Meibomian secretion are here classified. The pathologic alterations of the glands and lids attending them are described. An unusual case is reported in detail and other cases cited in the literature. A bibliography related to the subject is appended.

If a tarsal cartilage is pressed, as between two fingers, a secretion usually exudes from the mouth of each Meibomian gland. Normally this is a minute, clear, oily, droplet; best seen with the aid of a loupe. In numerous individuals the secretion is abnormal in quantity and character. Many lids will show the secretion from the majority of the glands normal, while that from a few will be definitely abnormal. When this is the case, the abnormal glands will usually be near one or the other canthus.

There are three quite distinct types of altered secretion. These types are definitely marked and for convenience of reference are called "A", "B", and "C" respectively. "C" is the most often seen. "A" is next in frequency.

"A". A dirty white substances of a consistency similar to or somewhat thicker than that of cream cheese. This often exudes in the form of long very thin threads, or as comparatively large masses, probably depending upon the size of the duct opening.

"B". A fluid resembling thin pus in color and consistency; no doubt a combination of "A" and "C".

"C". An oily fluid, clear or somewhat turbid and yellowish in color, which is expressed in an amount far exceeding normal.

The Meibomian are the largest sebaceous glands. They are identical in structure and character of secretion with the sebaceous glands of the skin.

Seborrhea is described as "a disease marked by a morbid and excessive discharge from the sebaceous glands." (Lippincott's Dictionary.) In seborrhea, "The mouths of the ducts of the sebaceous glands are more or less dilated, and from the dilated ducts slender filaments of sebaceous material can be readily expressed." (Hartzell's Text book.)

"Meibomian Seborrhea" seems an appropriate name for the condition of altered secretion of the tarsal glands.

It is not uncommon to find glands from which it is impossible to express any secretion. It may occur in chronic conjunctivitis in which the whole lid is thickened. In chalazia it will frequently be found impossible to express anything from the particular glands involved. The question arises as to whether the chalazion is the result or the cause of the obstruction. Repeated expression will sometimes restore the secretion.

Of what interest clinically is Meibomian seborrhea? If examined for, it is frequently found. During the past two or three years many cases have been under more or less prolonged observation. I think it may be said quite positively that only rarely are symptoms produced. It is to be regretted that the study has yielded results that are negative rather than positive. However, I am of the opinion that there are at least three pathologic conditions with which altered secretion of the tarsal glands has a definite relationship exclusive of the case described below, which is probably unique.

First. A localized congestion and thickening of the tarsal conjunctiva, usually the outer or inner third of the lower lid. The area varies in size, is quite well delimited, and not infrequently shows papillary roughening. The symptoms are those of chronic conjunctivitis.

Second. A chronic conjunctivitis involving the tarsal conjunctiva especially of the lower lid, and producing a thickening of the whole lid, a wide intermarginal space and a rounding of the lid margin. This type of conjunctivitis is sometimes responsible for a refractory, mushy ulceration of the cornea.

Third. Chalazion. As noted above it is frequently impossible to express secretion from the glands involved. Repeated attempts will usually give success and may result in the disappearance of the tumor, if not too large. In those cases of multiple and recurring chalazia, repeated expression will probably terminate the process.

During the past year or two, Dr. Charles Bentz has cultured the secretion from many cases with negative results.

Nothing is to be gained by citing cases illustrative of each of the above mentioned conditions. The conditions themselves are well enough known. Suffice it to say that treatment, aiming at improvement in the Meibomian secretion, has given gratifying results in a certain number of cases.

In addition to the usual methods employed, the treatment consists in thoro expression of the glands. Between the thumb nail of one hand and a finger nail of the other, this can be accomplished readily. It is well to precede it by cocain instillations. It should be repeated daily for a while and then at longer intervals, as recommended by Elschnig.[5] The following is a description of an exceptional case. It differs in several respects from any heretofore described.

S. J. F., an Austrian Hebrew, male, age 37, sewing machine worker. Family history negative, except that he states a sister is similarly afflicted. She lives in a distant city and this cannot be verified. Personal history negative except for a Neisser infection when a youth. Wassermann negative in two laboratories.

Present condition. For fifteen years there have been frequent periods of obstruction of vision due to the accumulation of a substance between the lids. This substance is carried over the cornea by the lid movements. If it remains upon the center of the cornea, as it often does, there is of course great interference with sight. This trouble was not preceded by any ocular disorder or other impairment of health, except that he remembers there was an eruption of his face which he describes as "pimples." There have been no signs of inflammation during this time. The condition has not only been the source of annoyance but has at times produced actual disability, causing him to lose positions because of

the effect on his vision. The accumulation is sometimes great enough to attract attention.

Examination shows one outstanding feature. There is a peculiar substance which moves up and down over the cornea with the lid movements. It may remain across the center over a period of several winkings. The patient dislodges it by rubbing his eyes. It is grayish white and perhaps best described as a fine soapy foam, or a coarse emulsion, not at all resembling pus or mucus. It may cover half the cornea, tho generally it is left somewhat below the pupil, so that its interference with vision is perhaps the exception rather than the rule. It is to be noted particularly that the substance does not gather on the tarsal conjunctiva, nor in the culdesacs, nor on the bulbar conjunctiva except in the interpalpebral space. It is also to be especially noted that the lids are not thickened and the conjunctiva thruout presents a normal appearance. The tarsal glands are the source of this material, moderate expression causing to be exuded from all the glands large quantities of secretion described above as types "A" and "B." If thoroly expressed, the annoying symptoms disappear for a few days.

Treatment has given but temporary relief. Astringents and yellow oxid have been tried. Repeated expression has been employed; but owing to the patient's disinclination to submit, not nearly to the extent considered necessary.

His lids were exposed to the Roentgen ray five times (3/8 of a unit each) by Dr. Grover Wende. This was discontinued contrary to the advice of Dr. Wende, who feels that a longer course of treatment would have given results. Would it be justifiable to split the tarsus and cauterize the wound as was done by Maklakoff[3] or to remove the tarsi as recommended by Reitsch.[6]

Dr. Chas. A. Bentz has very kindly examined the secretion and reports as follows: "The smears and cultures of the secretion expressed from the Meibomian gland of S. J. F., resulted as follows: The direct smears were covered with a fatty substance. It was necessary to treat the slides with alcohol and ether to remove the excess before staining and histologic examination. The examination showed the presence of considerable fatty secretion, occasional epithelial cells, and diphtheroid bacilli. The scale like substance removed from the conjunctiva contains the same organism and fatty like material.

Dextrose agar and blood agar were streaked with the material from the glands. After 24 hours incubation, colonies were fished and inoculated into Hiss litmus serum water medium, 1% dextrin, and 1% saccharose. Acid and coagulation appeared in the saccharose, but the dextrin remained unchanged. Guinea pigs inoculated with the filtrate from subcultures made in dextrose broth, using .2 c.c. per 100 grams body weight, show no pathologic results.

The direct smears, cultural results, and nonpathogenic properties, show the organism to be B. xerosis."

The ophthalmic text books do not touch upon the subject of alteration in the secretion of the tarsal glands, and a review of the literature reveals comparatively few references to the disorder. In an exhaustive treatment of the whole subject of diseases of the lids, including much experimental work, Cuenod[1] (1894) did not refer to this question of altered Meibomian secretion.

In 1894 J. A. Lydston[2] of Chicago described an inflammation of the conjunctiva which recurred coincidentally with the extrusion of sebaceous like material from the Meibomian glands. It was characterized by island shaped elevations between which was normal conjunctiva, resembling vernal catarrh. There was slight mucopurulent discharge. The retrotarsal folds were not affected. He could find no reference to a similar condition. He supposed the inflammation was excited by microbic or chemical irritation due to the Meibomian secretion. The process was controlled by cauterizing the palpebral edges with strong solution of silver nitrat.

In 1901 A. A. Maklakoff, Jr., of Moscow, reported a complete bacteriologic study of a case of purulent inflammation of the Meibomian glands which had existed for five years. The lids were markedly thickened, the lower being everted. Nodules the size of a pea were present. The Meibomian gland openings were dilated, it being possible to pass a Bowman probe number 2 into some of them, in one to the depth of 7 to 8 mm. The conjunctiva was hyperemic with swollen papillae. Gentle pressure on the tarsi caused yellowish pus to escape from the ducts. In the conjunctival sacs were yellow flocculi of mucus. All remaining parts of eyes were normal. Vision with each eye was 20/20. There was atrophic rhinitis with ozena. After several months of varied treatment without benefit, the margins of the lids were split so as to open freely the Meibomian glands. The wounds were curretted with a sharp spoon and cleansed with peroxid of hydrogen. This was repeated several times, and finally the thermocautery used to cauterize the wounds. This gave a satisfactory result. He could find no similar case in literature. The bacteriologic study showed the infection to have been due to the Bacillus mucosus ozenae.

In 1907 A. Natanson[4] of Moscow reported four cases of chronic multiple suppuration of the Meibomian glands. In one patient there were twenty or more foci of pus in the lids of one eye. Cultures in his second case showed the presence of staphylococcus pyogenes aureus. He called the condition Polyadenitis Meibomiana Chronica Suppurativa. There was no tendency to spontaneous evacuation of the pus, and it was remarkable that the conjunctiva was not inflamed.

A. Elschnig[5] in 1908 wrote that a chronic inflammation of the tarsal conjunctiva due to hypersecretion of the Meibomian glands was quite common. He states that up to that time a description of it had not appeared in literature. The culdesacs and bulbar conjunctiva are not usually affected. The lids are thickened and the intermarginal space reddened. The tarsal conjunctiva is thickened with a velvet like appearance due to hypertrophy of the papillae. The inflammation is more marked at or near the free border of the lids in contrast to nearly all other forms, in which the conjunctiva at the convex border of the tarsus is most intensely affected. On pressing the tarsi, large masses of pus like secretion come from the ducts. Examination shows it to be almost entirely fat, seldom mixed with cells. In the majority of cases no organisms can be found. Complete emptying of the Meibomian glands, frequently repeated in conjunction with astringents, has led to the cure of the conjunctivitis. It appears usually in people beyond forty years of age. He calls this condition "Conjunctivitis Meibomiana." Lydston[2] fourteen years previously adopted this name for the inflammation he described at that time.

In the case of Dr. W. Reitsch[6], but one lid was affected. A complete bacteriologic study was made and pure cultures of the Bacillus capsulatus mocosus obtained. A section including the Meibomian glands showed small cell infiltration about the gland ducts. Large number of bacilli were found in the ducts, and yet the duct epithelium was practically intact. The same bacteria were obtained from the nasal mucus.

The case was a girl of ten. Her left lower lid had been inflamed and swollen at times during the five years preceding. Reitsch found the skin of the lid red and swollen and the intermarginal space widened. The Meibomian gland openings were red and elevated and pressure caused pus to escape from them. The culdesacs and bulbar conjunctiva were not involved. Reitsch refers to Natanson's[4] cases and considers them from the latter's description to be examples of the not uncommon hordeolum internum. Particular mention is made of the fact that in spite of the constant presence of great numbers of the bacilli, the Meibomian glands of the upper lid and the lacrimal passages were not infected. Vari-

ous treatments were employed, including zinc ionization and radium, but without effect. Reitsch concluded that extirpation of the tarsus was indicated, but he had not operated at the time of his report.

Dr. Julius Wolff[7] presented a case before the New York Academy of Medicine. There was hypersecretion of the Meibomian glands and all the lids were swollen, red, and nodular. There was pain and photophobia. Expression of the glands several times a week for four months resulted in marked improvement. In the course of the discussion, Dr. Weeks stated that he had seen a similar case in a girl of six.

Dr. G. Anselmi of Modena[8] accidentally came upon a case of apparent localized pigmentation of the tarsal conjunctiva. Histologic examination showed that instead of pigment deposit, the discoloration was due to a cystic formation of some Meibomian glands.

In 1918 K. Hiwatari[9] of Kagoshima, Japan, reported three cases which coincided with Elschnig's description. The secretion was nearly solid fat and was sterile. He thinks that daily expression is ineffective treatment.

Two years ago G. Pereyra[10] of Florence, reported three cases of ozena, in each of which there was a chronic conjunctivitis characterized by the presence of dark yellow plaques on the tarsal conjunctiva. Pressure caused to be discharged from the Meibomian ducts a yellowish viscous substance. The bacillus ozenae mucosus was found in this secretion, as well as in the nose, and he thought the conjunctival changes to be due to the infection of the Meibomian glands with this organism.

All the cases reported and referred to above have many points of resemblance to each other. The altered secretion, the chronicity, the thickening of the lids and changed margin, the congestion and thickening of the tarsal conjunctiva, without involvement of the conjunctiva of the culdesacs or globe, the mucopurulent discharge, and the subjective symptoms dependent upon the inflammation characterized them all. They divide themselves into two groups by the character of the secretion. In the cases of Maklakoff, Reitsch, Pereya, and Natanson, the secretion is described as purulent. In those of Lydston, Elschnig, Wolff, and Hiwatari it was not pus but fat.

In my case the altered secretion is fat and not pus. It differs from all the others in important respects.

First: The only subjective symptom is the obscuration of vison, and this is purely mechanical.

Second: There is no inflammation whatever, notwithstanding the long duration of the disorder.

Third: There are no lid or conjunctival changes.

Fourth: The spontaneous evacuation of the secretion in such quantities as to obscure vision.

Conclusion. Many lids show altered Meibomian secretion. The cause of this alteration is not known. Bacteriologic examination shows the secretion to be usually sterile. Abnormal lid conditions probably arise from these changed secretions. The treatment is not entirely satisfactory. Further microscopic, bacteriologic, and possibly chemical study is needed.

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CERTAIN APPEARANCES OBSERVED IN THE EYEGROUND OF THE TUBERCULOUS.

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The writer has observed a special fullness and tortuousity of the retinal vessels in patients suffering from tuberculosis, and those whose family history included cases of this disease. No heart lesions were present in these patients. Attention is called to these changes in the hope that they will be looked for by other ophthalmologists.

The condition to be described does not refer to the tubercles of the choroid usually seen in the last stages of tuberculosis, nor to the perivascular types with hemorrhages, so well described by Finnoff,[1] nor to the exudative or conglomerate types; but to an anomalous distribution, multiplication and tortuosity of the retinal vessels, principally venous, but frequently arterial as well.

I have been watching these anomalies for twenty years, being astounded at the condition found in a fellow practitioner of this city when refracting him. As he coughed frequently, expectorated moderately, and was noticeably dyspneic, I assumed the condition was due to undue fullness of his pulmonary venous system, thus producing the fullness and tortuosity of his retinal vessels. This patient is living, and in active practice, over fifty years of age, his lung condition having become stayed. He is, however, dyspneic. In sequence, I observed cases with similarly appearing eye grounds who were tuberculous, or

with stayed lesions, but who never had marked shortness of breath, which disproved the belief that the appearances of the retina, in the case mentioned, are due to undue fullness of the pulmonary circulation.

Other similar cases were observed year after year, until certain characteristics seemed to form an entity. At times I was impressed with these characteristics in apparently healthy young adults, and in children whose history showed them to be of tuberculous ancestry.

Yesterday, a patient consulted me whose retina showed great increase in the number of the retinal vessels with extreme tortuosity. In addition, there were seen knotty kinks of the small veins, convincing me that I should find high blood pressure and other evidences of such condition. Altho there are believed to be beginning changes of the vessel coats, I can find no distinct indentations where veins and arteries cross. This man is fifty years of age, in active business pursuits. He has been under the care of excellent internists for two years, whose investigations show that he has an abnormally low blood pressure, now 110; but before treatment it registered systolic 90, diastolic 65. Wassermann negative. Blood count normal. Low hemoglobin and normal conditions of the urine, excepting low specific gravity. The X-ray findings of his chest showed that, in the hiluses of the lungs, there is dense infiltration from a tuberculosis of former years, of which he had never been conscious.

This patient claims to have never had cough, hemoptysis, dyspnea or any other symptoms arousing any suspicion of tuberculosis. He has never had any severe or prolonged illness. He is an overworked, too strenuous business man, irritable and sleepless; symptoms accompanying arterial sclerosis.

During the seven years that I have recorded these retinal peculiarities, I find, sometimes, somewhat similar appearances in the constipated and those whose elimination is faulty.

Two cases of my earlier tabulation had these retinal peculiarities; both had been fast runners in their college days. One had paced; the other running two miles daily. One patient had hypertrophy of the heart. He claims he never had tuberculosis. The other patient's mother had, and was cured of tuberculosis by residing in Colorado. Both are physicians. Unfortunately I have no X-ray findings of these cases, which might be enlightening.

It has been very difficult in my active work to go back over this long period to search my files; yet this has been done, and I can cite several cases in confirmation. Only comparatively recently (seven years) have I inquired into patients' past histories when I find such conditions in the eyeground. Many times when negative replies are given, further inquiry discloses the fact that one or the other of the patient's parents have been tuberculous.

The causes of these conditions seemed unfathomable until I occasionally found similar conditions in patients lacking normal eliminative functions. Then Jackson's article on "Tuberculosis as a Focal Disease," awakened me to the belief that he had opened the nut and disclosed the rich kernel within. We have many instances of these so-called focal features in the tuberculous; headaches particularly, and the usual train of bad tongue, breath and indigestion. One of the great drawbacks to health in these patients is intestinal disfunction, and frequently these annoyances are relieved by an appendectomy. Is it possible that the toxins of tuberculosis and the deficiency in eliminating them, both in the predisposed and in those whose lesions are active or stayed, may explain the anomalous appearances described? We have alterations in the course and in the appearances and in the number of retinal vessels in polycythemia. Acquired tortuosity of the retinal vessels occurs also in leukemia. The appearances I describe are similar to the congenital tortuosity which Levin[3] attributes to "an insufficiency of elastic vascular fibers." The bending of the ves-

sels is chiefly in the lateral plane and not so much in the anteroperpendicular, coming under the description of inordinate physiologic or congenital tortuosity, as described by Beard.[4] No heart lesions have been present in the cases I describe as tuberculosis. There is yet to be considered the influence of the endocrin glands, of which much is still to be learned.

There is no difference noted in the eyeground appearance between those cases in the active or stayed stage of the disease, nor in those assumed to be due to hereditary influence. I have tabulated 325 cases from private practice. Of these:

13.23% are classed as possibly due to heredity.

36.31% are in cases of tuberculosis, active or stayed.

50.15% in cases showing the vascular condition, on which appearance this article is based, but of which no history is noted in case records and no cause can be obtained.

There are sure to be some of these latter cases who have had tuberculosis, known or unsuspected, but this cannot be proven without X-rays of their chests, which are obviously impossible to obtain; therefore the proportion of the real tubercular cases, under no circumstances, can be lessened. Better knowledge of many is more liable to increase the percentage of the tuberculous.

The fact that about one-half of the cases observed with this vascular retinal condition are in the individual whose lesions are active or stayed, or in who heredity is a vulnerable factor, certainly gives cause for thought. The writer practices in a section where he meets probably a larger proportion of these unfortunates than other regions might show, and he makes no claim other than for originality of observation. His effort is largely to bring these facts before his fellows so that they may aid him in making further observations.

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DISCIFORM KERATITIS FOLLOWING SMALLPOX.

CHARLES L. SMITH, A.B., M.D.

INDEPENDENCE, KANSAS.

Four cases are here reported. In three of them the corneal disease followed smallpox, and in two the eyes had to be removed. Read before the Colorado Congress, July, 1921.

"This is a keratitis that is allied to ulcus serpens, and consists in the development in the middle layers of the cornea of a gray disc-shaped opacity. In the center of the disc a small, more deeply clouded speck is commonly observed. The periphery of the disc is sharply delineated by a border of deeper gray, which in many cases, is made up of concentric lines." (Fuchs.) In these few words we have the essential visible characteristics that identify this form of keratitis. It runs a rather protracted course and the indications for treatment may be complicated. Fuchs says, "only exceptionally a small loss of substance develops over a circumscribed area." In two of the following cases there was large loss of corneal substance, with loss of the eyes. Fox in his treatise on Ophthalmology says, "Treatment is of no avail in effecting a cure."

I wish to recount four cases I have seen; three of the cases following a few weeks after recovery from attacks of smallpox. The fourth followed a mild trauma to the cornea. In three

cases that I saw early, the characteristic visible signs of a disciform keratitis, the gray disc of infiltrate and white speck, did not appear for two weeks or more after the beginning of the inflammation.

Case 1. A girl, 16 years old, was brought to me July 28. About two months before, she had had smallpox. The left eye had some pericorneal injection and the cornea had a dull appearance with no infiltration, and its surface was dull and rough looking. It looked like a parenchymatous keratitis and a tentative diagnosis of interstitial keratitis was made. Treatment with atropin and general medication was instituted. Salicylates were first given. For a time the eye seemed to do well, but after two weeks it grew worse and the characteristic white speck appeared in the cornea with the concentric gray rings and radiating lines. It gradually became aggravated with remissions until two-thirds of the cornea became waxy looking, as tho it consisted of a layer of pus beneath Bowman's membrane. Then the corneal surface began to break down in spots and finally one half melted away. The ulcerating area healed from the outer margins. The course of the keratitis was about two and a half months, the eye then developed secondary glaucoma and was removed the following March.

Case 2. A widow, 33 years of age, came to me November 25, of the same year. In the cornea of the left eye, over the pupil, was a dense gray mass, 2 1/2 mm.. to 3 mm. in diameter. The pupil was small and the eye injected, but not extremely so. She had been treating with an oculist in a neighboring city since July when the trouble began. She said the haziness appeared in the eye in July, and that she had had an attack of smallpox a month or more before. She had been visiting the oculist at intervals, and had worked a part of the time in an office. As she was apparently not suffering very much, I wished to test the iris to see if it were free, before doing a Saemisch incision. At the end of three days, as I could not positively promise that my treatment would save the eye, she returned to the former oculist and had the eye removed.

Case 3. My confrere in Independence asked me to take charge of one of his patients, a young man 20 years of age, while he was away on a vacation. I first saw the patient June 2 in the doctor's office and concurred in the probable diagnosis of interstitial keratitis. The patient was on mercury, and atropin locally. He came to my office June 4. At this time the corneal surface was rough and dull in appearance, with pericorneal injection. He returned June 6, with the picture of disciform keratitis well developed; a disc with sharply marked margin and a white speck near the center of the disc. The doctor tells me he first saw the patient May 22. The patient now told me that he had had smallpox about two months before the eye trouble began. I diagnosed pus in the white speck and urged him to go to the hospital and let me do a Saemisch incision. In the afternoon of June 8, I did a small Saemisch incision thru the disc and transversely thru the middle of the white speck. The white speck was approximately 1/2 mm. by 1 1/2 mm. in size. On making the incision, one-half of the white speck came away and the other half sloughed out the second day following. The wound closed promptly, and from the second day on I treated the eye once daily with dionin and atropin powder, equal parts. This powder was left in the eye five minutes, then flushed out and argyrol and atropin instilled. A light cover was then applied to the eye.

I should add that when the clinical signs of a disciform keratitis indicated the real nature of the trouble, the mercurial treatment was stopped and the patient was put on sodium salicylat. It was given in Gifford's prescription but a smaller dosage. The eye did well. The pain, which had been quite extreme, was relieved and the cornea cleared rapidly of the gray infiltration. By the end of the week the outline of the disc was still to be made out, but the gray infiltra-

tion had nearly all disappeared. As my confrere had returned, I sent the patient back to him with a full description of what I had done. I am told that treatment similar to that I had instituted was continued until August before the eye entirely quieted down.

Case 4. This case is very interesting as we know how it came about, and it did not follow smallpox or any other general infection. A lady, 31 years of age, came to me April 4 of this year with an irregular branching ulcer of the cornea covering the pupillary area. There was a slight injection. She claimed she had not been sick recently nor had the eye been injured. The right eye had simply become irritated about a week before. It was not particularly painful, but her husband insisted that she should have something done for it. They lived nine miles from town. A tentative diagnosis of dendritic keratitis of undetermined cause was made. She was put on atropin and argyrol locally and salicylat internally. The expectant treatment was given, as the real cause of the keratitis was not clear. She was asked to return the second day.

She returned the third day, April 7, with a whitish gray ring of infiltration. She told me she recalled to mind that her little girl's straw hat had blown in her face, and the rim struck her in the eye on March 26. The eye had become irritated the next day, and had continued irritated ever since.

At this time there was no white speck nor radiating lines to be seen. A solution of dionin to be used twice daily was now added to the treatment. She returned the 8th, 10th, and 13th, with the eye much the same. On the 16th the eye did not appear so well, and on the 18th she returned with the typical visible signs of disciform keratitis well developed. The white speck was present and the radiating rays were very conspicuous.

As the weather was cold and rainy, I insisted she go to the hospital for treatment. She would not consent, and she did not return to me again.

Fuchs says: "The cause of the disease is an infection of the cornea from without, the central gray speck representing the point of entry of the bacteria." In Case 4 the superficial ulceration had entirely disappeared before the clinical signs of a disciform keratitis appeared. That the white speck is a mass of pus or necrotic tissue would seem proven from the finding in Case 3, and that the white speck is not the point of entry of bacteria but is situated in the substance of the cornea.

Whether the three cases following the smallpox developed from a slight superficial corneal injury, or whether they were due to endogenous infection I cannot decide. Cases 1 and 2 insisted the eyes had not been hurt but that the eye simply became inflamed. That from the superficial injury to the skin a mild or severe ulceration may develop, or an abscess in a deeper tissue may form, is well known. If this form of keratitis may develop from a slight superficial injury, or accommodative strain may bring on an iritis when the systemic condition of the patient is bad, why may not accommodative strain or a slight injury bring on the form of keratitis as in cases following smallpox?

In a review of an article by Dr. F. H. Verhoeff, in Practical Medicine Series, 1920, Vol. III, we find: "Certain cases of disciform keratitis are of the same nature as keratitis profunda. The corneal changes in keratitis profunda are due to the action of diffusible toxic substances arising near the anterior surface. The microscopic findings in the present case strongly indicate a neuropathic origin for keratitis profunda."

Conclusions. In these cases, we find that the characteristic signs of disciform keratitis may not appear for two weeks or more after the eye becomes inflamed.

There is a parenchymatous inflammation of the cornea with formation of an area of pus or necrotic tissue homologous to an abscess.

One should be very diligent in the treatment of trivial injuries of the cornea that do not heal promptly.

NOTES, CASES AND INSTRUMENTS

REMOVAL OF CINDER FROM ANTERIOR CHAMBER.

HUNTER W. SCARLETT, M.D.

PHILADELPHIA, PA.

On September 1, 1920, J. R. presented himself with the following history:

The day previously while walking along the street, during a violent wind storm, he suddenly felt a sharp pain in his right eye. It was so severe that he consulted his family physician, who attempted to remove a cinder which he said was in the eye. No relief was afforded at this time.

Examination the following day revealed an injected eyeball, with a small hazy spot on the cornea about 2 mm. in from the limbus, at 8 o'clock. This spot colored with a fluorescein. Just beneath it, lying on the anterior surface of the iris, was what appeared to be a small black spicule of cinder about 2 mm. in length, which moved with the iris on contraction and dilatation of the pupil.

A keratome incision was made at the limbus at about 7 o'clock. By means of a thin nontoothed forceps, the spicule was removed, after gently depressing the edge of the wound with a spatula.

The recovery was uneventful, and to date, one year after the accident, no evidence of cyst formation has appeared.

The question arises; did the sharp spicule penetrate the cornea and lodge on the anterior surface of the iris; or, did it chance to strike the cornea with its sharp edge, partially penetrate it, and was then pushed entirely thru by the efforts of the family physician to remove it? The latter view seems most probable.

PERMANENT VASCULARIZATION FOLLOWING PARENCHYMATOUS KERATITIS.

ROBERT VON DER HEYDT, M.D.

CHICAGO.

Some decades ago Hirschberg drew attention to the permanently visible vessel remnants in eyes which have suffered a parenchymatous keratitis.

These bristle like structures were accepted as being comparatively obliterated vessels. (Axenfeld text book.) It has remained for the Gullstrand slit lamp to disclose that their function as carriers of blood and blood plasma remains a permanent one.

Krueckow and Fuchs were the first to describe these vessels as being situated anatomically in the middle and posterior corneal layers. They are now disclosed as being exclusively situated in the deep parenchyma, in the form of parallel lines joining to form a very acute loop toward the corneal middle, when seen by stereoscopic microscopic examination in the living eye. They may be crossed by similar vessels within another adjacent layer, however, remaining parallel to one another when within the same layer. This parallelism within the same layer may be due to the peculiar structure of the parenchyma, which allows of a penetration along a line of least resistance, somewhat analogous to the development of the socalled Bowman's canaliculi, which latter form when air enters the corneal substance.

The veins are seen to be flat and quite large compared to the arteries, the circulation within them quite slow, consequently the latter may be easily observed, especially when the stroma above is comparatively free of infiltration. The individual corpuscles may be counted as they roll along.

Koeppe describes a visible pulsation, I have been able to see only a very rapid flow in the arterioles under a high magnification (61 times). There is a jerklike intermittent movement in the veins, which cannot physiologically be termed a pulsation.

Physiologists, among them Krogh and Hooker, have recently found that tho normal capillaries may be without muscular coats, they may still exhibit active movement and take part in regulating their own diameter in response to the needs of the tissues which they supply.

Many capillaries may be so narrow at times that they permit no corpuscles to pass, yet allow of some circulation of plasma thru the tissues. This I have repeatedly confirmed by observation in the living cornea.

When the need of a certain supply of blood to the corneal tissue has once been established by an active pathologic process, such as a parenchymatous keratitis, it seems necessary for the parts thus altered always to have need of this supply for proper nutrition.

This phenomenon is well illustrated in many cases of keratitis that I have observed within the last year. These corneas show an active vascularization ten to twenty, and in one case forty-five years after the acute inflammatory process had subsided.

During the active stage of parenchymatous keratitis, the red tinge of the corneal stroma is in a great part seen to be due to an imbibition by the tissues of red corpuscles and their products of decomposition.

In May, 1921, I had under observation the case of a woman 54 years of age, in whom I discovered an active corneal vascularization. This was 45 years after quiescence of the inflammatory process. Her right eye showed about 25 deep seated vessels, of which all but half a dozen carried blood, only a few carried plasma. On induced hyperemia they all filled up.

I extracted a cataract from this eye three months ago, and have now a complete reestablishment of the circulation, including the upper half of the cornea, which necessarily was cut off from its supply by the incision. The persistence of this means of circulation and its reestablishment of function after this long drawn out deprivation of supply, has proven to me that the need of flowing blood for the nourishment of the pathologically altered stroma, now after nearly half of a century, may be construed almost a physiologic necessity.

From now on it may be accepted that all socalled Hirschberg vessels are active blood carriers. They are not the remnants of former vascular activity, but blood vessels in a state of more or less passivity of function. The advent of the Gullstrand slit lamp has made their study possible in the living eye.

At one time von Michel suggested that one of the forms of parenchymatous processes in the cornea was caused by a nutritional disturbance due to the obliteration of some of the pericorneal vessels; that is, the conjunctival wreath of vessels at the limbus. Clausen recently advanced this belief. An obliteration of these vessels has just been disproven by Kunze, who made a most thoro anatomic examination of an active case of luetic keratitis. (Graefe's Arch. f. Ophth. Bd. 102. Aug., 1920). Here again the slit lamp comes to our aid by disclosing a marked extension of this superficial wreath of vessels, loops and arcades toward the corneal middle in all cases of advanced keratitis. This advancement and increased vascularization is, however, not pathognomonic of parenchymatous keratitis but may also be seen in other cases of corneal disease, where a bulbar hyperemia has continued for a long period of time.

A NEW TRIAL FRAME.

M. E. Smukler, M.D.

PHILADELPHIA, PA.

Attention is called to a new trial frame having the following features:

It is light and rigid, having no springs in its construction, except one in each temple.

It is very easily adjusted to the face and when adjusted it sets comfortably and snugly.

Each pupil is adjusted separately, and the frame may be tilted downward for the reading test.

The details of its construction may be understood from the accompanying drawings (page 37) which are made of actual size.

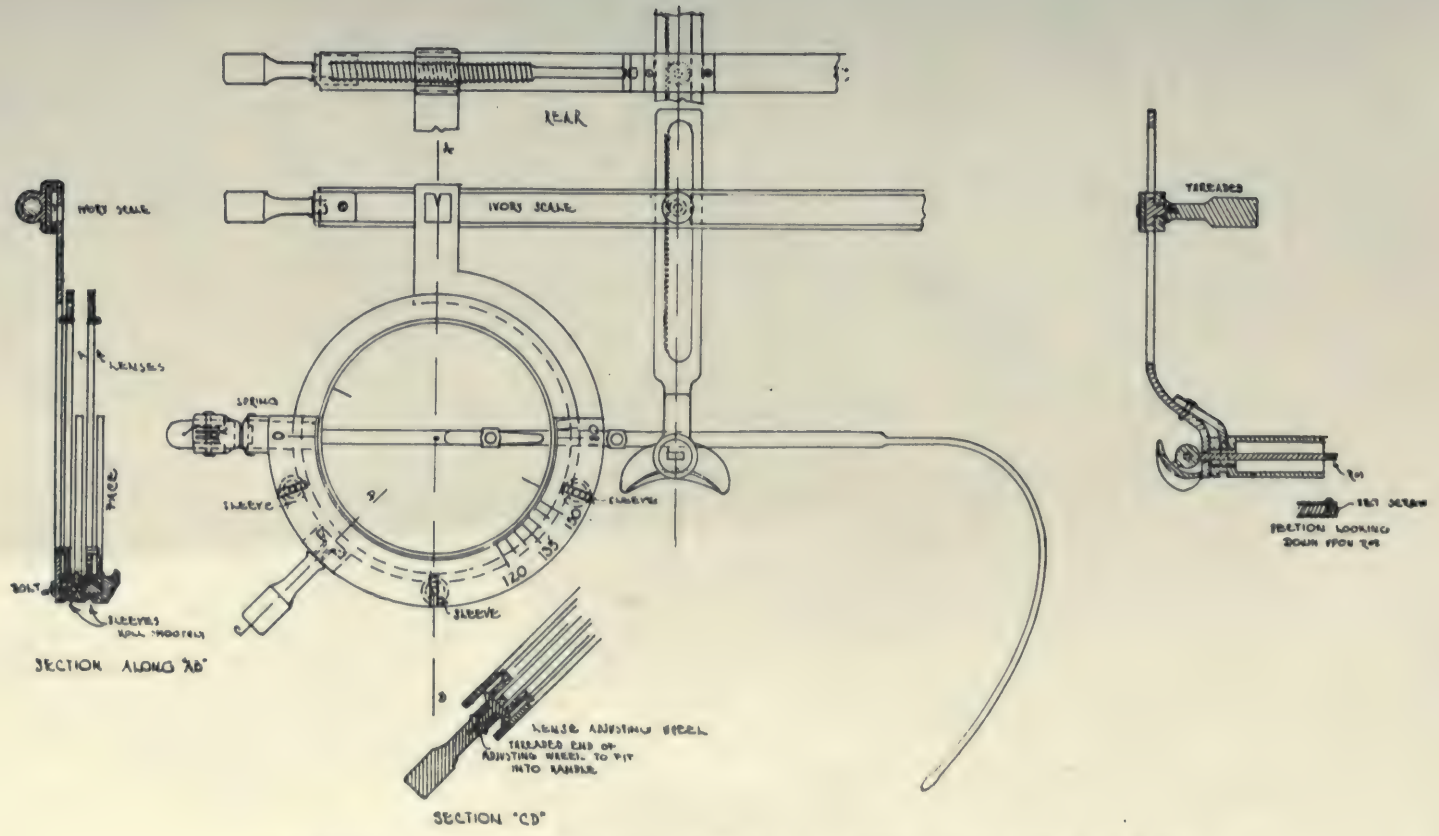

Diagram showing construction of trial frame as suggested by Dr. Smukler. Parts shown of actual size.

A CASE OF SYMPATHETIC OPHTHALMIA.

CARL MCCLELLAND, A.B., M.D., F.A.C.S.

DETROIT, MICHIGAN.

Read before the Detroit Ophthalmological and Otological Club, May, 1921.

O. W., farmer, age 25 years, came to me August, 1920, complaining of soreness and loss of vision in the left eye. Three days before, while working with a coal chisel, a chip of steel had struck his left eyeball. He thought nothing of the injury at the time, and continued working until his eye became so painful that he had to consult a specialist. He had been treated by his family physician, who thought there was nothing in the eye.

Examination in my office showed, vision in the right eye, 20/20; left eye, light perception only, was intensely inflamed, cornea cloudy, pupil small and irregular, and the anterior chamber showed a beginning hypopyon. There was a small wound in the sclera at the scleral margin, at the region of six o'clock. Iris was prolapsed into the wound. The giant magnet was used for diagnostic purposes, and caused great pain, when the eye was brought in the field of the magnet. He was referred immediately for X-ray. The report showed a foreign body approximately three millimeters long, two millimeters wide and one millimeter thick, well forward in the anterior quadrant of the eye, lodged in the ciliary body. This was removed at the hospital the following morning, with very little difficulty, by inserting the small tip of the magnet between the lips of the wound in the sclera.

On account of the length of time since the accident, the position of the steel in the eye, the amount of infection and reaction that had occurred and the loss of vision in the eye, the patient was advised to have the eyeball removed in order to avoid sympathetic inflammation in the right eye. This did not meet with the approval of the patient or his uncle, who is a physician. He remained in the hospital four days, during which time the infection rapidly subsided, but there was still considerable iritis in the injured eye, when he was discharged. The right eye was perfectly quiet and vision normal.

The patient was not seen again for six weeks. Examination, at this time showed acute ciliary congestion and tenderness in the right eye, vision of less than 20/200, pupil contracted. The left eye was practically free from inflammation. The patient said that injured eye had been quiet and comfortable for two weeks. Believing that we had a beginning sympathetic disease in the uninjured eye, he was immediately sent to the hospital, and the injured eye was enucleated the next morning.

Patient was referred to Dr. C. E. Vreeland for thoro physical examination, and to have X-ray for any involvement of his teeth. The right lower molar was found to have an abscess at its root, and it was extracted. Dr. Vreeland found a history of chronic constipation and intestinal disturbance, which he corrected with diet. This treatment together with the usual atropin and hot compresses, also huge doses of sodium salicylat, one grain per pound body weight, was given daily. His condition improved and he left the hospital in nine days. Vision in the right eye was 20/100, cornea clear, very few K.P. deposits, vitreous somewhat cloudy, but rapidly clearing.

At this time, he was shown at the Detroit Ophthalmological and Otological club. It was the opinion of all who saw him, that the prognosis was very good. The uveitis was subsiding, and unless complications arose, he should get good results and good vision.

Three weeks later the patient returned. He told me that his eye had cleared up and vision was good, but because of the pressing need of work on the farm, he had driven a tractor a few days, also an automobile for a neighbor, from dark until daylight. After he had rested about six hours, he again drove the car all night, and he had caught cold. His eye became

very sore, with great decrease in the amount of vision.

Examination showed, that he had only light perception, and there was much more involvement in the uveal tract than there had been at any time since the inflammation started. He was advised to come into the hospital, which he did in January, 1921. Further examination showed that pupil was fixed with adhesions, atropin caused practically no dilatation, cornea was clear, details of fundus could not be made out. The patient's general condition was bad, appetite poor, bowels irregular, moved only when a cathartic was taken, and he was greatly depressed mentally. Dr. Vreeland was again called, and Dr. Harold Wilson saw the patient with me.

The condition of the eye, at this time was very unfavorable. On account of his stomach and bowel condition, it was thought inadvisable to start the sodium salicylat treatment again; in fact, any medication by mouth seemed to be out of the question, as he was unable to retain it. After discussing the case with Dr. Frothingham, it was finally decided to use hypodermic injections of milk. Laboratory examination at this time showed the urine normal. Blood showed five million reds, 8,750 whites, 70% polynuclear and about 20% mononuclear. Wassermann negative.

On January 24, 5 cc. of milk which had previously been brought to boiling point, was injected into the gluteus muscle. There was practically no reaction to the injection, except the blood. The white count rose to 13,750, there was no relief from pain in the eye, nor was there any change in its appearance. In five days 5 cc. of milk was again injected. This time the white count rose to 15,500. There was no general reaction. A third injection was given in five days, the white cell count this time rose to 16,750. A new interne on service made the injection, and the patient got a gluteal abscess, which had to be opened and drained. This ended the milk injections, and he refused further treatment in this line. While we did get the reaction in the blood picture, which is considered necessary in order to have a favorable result from the milk injections, yet so far as I could see we got absolutely no reaction upon the eye. We tried the sodium salicylat again for a few days, while he could take it. It quieted the pain in the eye and made him more comfortable, when it had to be discontinued because of his stomach symptoms.

The patient left the hospital February 17, 1921. The eye was still very much inflamed. The vision practically the same as when he came in, light perception only. I have heard that his condition remains unchanged.

This case represents a number of interesting points: 1. Location of steel in the "danger zone" of the eye. 2. There was severe infection and hypopyon present. 3. Three days had elapsed since the accident. 4. Patient had distinct evidences of other foci of infection, viz, apical abscess in one tooth, chronic constipation. However, the removal of these did not seem to have any effect upon the progress of the disease. 5. Injections of milk proved ineffectual; in fact nothing seemed to have any lasting effect in arresting the progress of this severe infection.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

November 7, 1921.

Dr. E. B. Heckel, President.

Traumatic Dislocation and Absorption of Lens.

Dr. Edward Stieren presented a case of traumatic dislocation of the lens into the vitreous in a high myope, followed by absorption of the lens. The 29 year old patient stated, Aug. 29, 1921, that the left eye had been struck with a baseball a week before. At first examination the pupil was dilated ad maximum; the anterior chamber obliterated; the tension 36 mm., McLean. The patient was a high myope, his correction being—12 S. in each eye. The vitreous was blood-stained but sufficiently transparent to allow a globular body fixed in the anterior lower vitreous chamber to be detected.

Under myotics the pupil contracted and the tension became normal. Potassium iodid was given internally, and the vitreous cleared sufficiently to enable one to identify the globular body in the vitreous as the crystalline lens. As the lens remained stationary, it is presumed that the lower suspensory ligament remained attached to the lens capsule and anchored it in the position in which it was first noted. The lens has gradually become smaller by absorption, until at the present time there is practically nothing remaining but the lens capsule. With —3 D. S., the vision is now 6/60 and gradually im-

Markel's case of tumor near pituitary body. Front view of patient and side view

proving. The vitreous still remains somewhat cloudy.

Tumor Near Pituitary Body.

Dr. J. Clyde Markel reported a case of tumor in the vicinity of the pituitary body. The patient was Mrs. W. N., colored, aged 28, with negative family and personal history, until about six years ago, she suddenly had an attack of momentary blindness and dizziness and lost consciousness. This attack was of short duration and was the only one she had ever had. She is about 6 feet tall, and weighed 155 pounds. Her general appearance is shown in Figs. 1 and 2. Her memory is poor. She does the usual amount of house work daily without any unusual fatigue, tho at times gets short of breath and heart palpitates on any unusual exertion.

Bowels regular, no constipation, no unusual appetite for sugar or candy. Skin normal. Has lost several molars, has several bad teeth, no pyorrhea. No anosmia or gustatory interference. Blood Wassermann negative.

Eight years ago, a small soft tumor mass appeared on the second toe of each foot; these were painful on pressure, necessitating the splitting of her shoes to obtain comfort. Four years ago, a mass the size of a marble appeared on the lobe of the left ear. Four years ago, vision in right eye began to fail gradually, accompanied by some pain in the eye and head. Saw a local doctor at the time, who told her she needed glasses, but none were got until recently, when she obtained a pair of —5.00 spheres for constant use. These were not comfortable and were not worn.

She came to the dispensary on account of failing vision in the right eye.

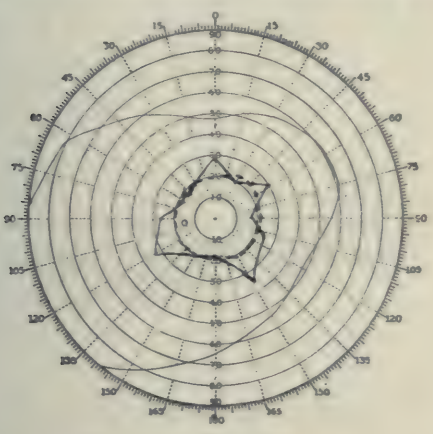

Fig. 3.

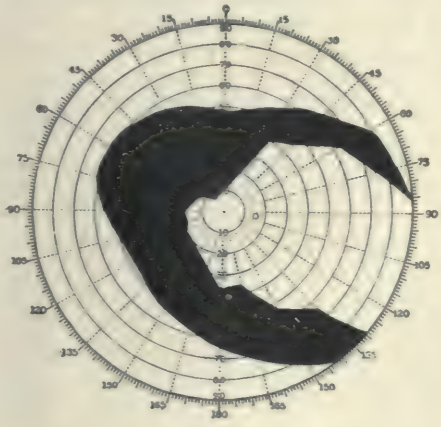

Fig. 4.

Fields of vision of Markel's case. Fig. 3, left eye. Fig. 4, right eye. In Fig. 3 the solid line indicates boundary of the field for red; the broken line boundary of the field for green

Vision R. 3/200, eccentric; L. 20/20? Has marked proptosis of both eyes, more marked in the right. Partial ptosis of the right lid.

Scarcely any movement in the right lower lid. When the eyes are closed, the lower does not meet the upper in the right by about 6 mm., and in the left by 3 mm. On forced closure, left lids meet, but right are separated by 3 mm. Von Graefe sign not present. Right eye diverges up and out. There is a paresis of the internal recti of both eyes, and of the inferior rectus of the right. Pupils equal, react to light, accommodation and consensually, also when light is thrown on the temporal half of the retina of R., giving Wernicke's hemiopic reaction.

Ophthalmoscopic examination shows media clear. Discs slightly oval, pale white, atrophy more marked in right eye. Fields: R. almost the entire nasal field obliterated, with no color perception. L. normal for form, with

some interlacing of red and green. See Figs. 3 and 4.

The X-ray examination of Mrs. M. W. reveals evidence of a tumor springing from the region of the sella turcica, and deviating slightly to the right of the median line of the skull. As seen in the lateral view, it is approximately 32 mm. in width, at its greatest diameter at the base, and 27 mm. at its greatest width at the apex. Its greatest length is approximately 46 mm. Its greatest lateral diameter, as seen in the anteroposterior view, is approximately 38 mm. It is of irregular outline and apparently has calculus like deposits scattered thruout. The landmarks of the sella turcica are practically obliterated by the tumor.

Discussion. Dr. Stieren stated that from the appearance of the shadow in the radiogram examined by him, he was inclined to the view that the lesion is a cyst, on account of the limiting membrane present. The proptosis is also due to a similar condition. The tumor mass no doubt arises from the posterior part of the pituitary body. That there have been no localizing symptoms developed is due to the slow growth of the lesion. He suggested radiographic examination in different positions to determine if gravity would make any change in the shape or localization of the mass.

Dr. Heckel suggested excision of the tumors on the ears and toes of the patient to determine their pathologic nature. He is of the opinion that the cerebral tumor is not a neurofibroma.

Dr. Krebs stated that in a case of pituitary cyst which was operated intranasally, the fluid never ceased dripping and the patient died three weeks after operation.

Fluid Vitreous and Cataract Extraction.

Dr. S. L. Koch reported a case of fluid vitreous complicating cataract extraction. The combined operation was done up to the completion of the capsulotomy. The lens could not be tilted, and vitreous of the consistency of thin oil presented. The operation was discontinued; the eye has healed and remains quiet after three weeks. Light perception and projection are good.

Discussion. Dr. Stieren advised transfixion of the edge of the lens with Fisher's needle inserted from the temporal side of the corneal section. Pressure forward on the cornea, he believed, would deliver the lens with inconsequential loss of vitreous.

Dr. Heckel advocated a new corneal section well within the clear cornea. Pressure above would cause the corneal flap to override the upper edge of the lens, which would be anchored and permit of delivery from pressure below.

G. H. Shuman,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

October 15, 1921.

Dr. F. R. Spencer presiding.

Traumatic Irideremia.

E. T. Boyd, Denver, presented a man aged twenty eight years whose right eye had been struck with great force by the chain of a chain pulley. When the patient was seen one hour after the injury, the eye was bleeding freely, and there was a long string of tissue lying on the cheek. After cleansing, this was found to be iris tissue leading to a wound one cm. long in the cornea, at the upper part of the limbus. Blood clot, iris, and vitreous presented in the wound. The anterior chamber was full of blood. Dr. Boyd cut away the iris and the bead of vitreous. After absorption of the blood in the anterior chamber, it was apparent that absolutely no iris tissue remained except a small tag engaged in the wound. There had also been rupture of the zonula and of the capsule of the lens just below the site of the external injury. At the time of presentation all lens matter had been absorbed, but there was a dense capsular membrane in the center and above. A fine outline of the capsule of the lens could be seen clearly except above. The vision was that of moving objects only.

Discussion. E. R. Neeper, Colorado Springs, had seen only one similar case. The child had seemed to suffer less annoyance than one would have expected; and when the case was seen again some years later, there was very fair vision and the eye was comfortable.

D. H. Coover, Denver, some years ago saw a similar case due to a blow from a piece of kindling. The lens remained clear for three years and then became cataractous. After ten years the eye became blind and painful and had to be removed

Corneal Tuberculosis.

H. Darrow, Denver (by invitation), presented a man aged forty five years, who for the past eighteen months had been under the care of various physicians on account of a disturbance of vision of the right eye, associated with lacrimation and photophobia. At various times the tonsils and all the teeth had been removed, but without benefit. About one year before presentation, the left eye had become affected, and the patient became incapacitated for work. Examination on April 10, 1921, showed the right eyelids red and edematous, injection of the bulbar and ocular conjunctiva, and marked disturbance of the cornea. The latter was cloudy thruout, the most pronounced opacity consisting of a band about four mm. broad extending from the temporal side horizontally across the cornea and terminating in a yellowish white mass of exudate about two mm. in diameter. There were three or four other similar but smaller patches elsewhere in the cornea. These masses were approached by fine blood vessels. They were more or less superficial, and at several points there was the appearance of a loss of the superficial layers of the cornea, but these spots failed to stain with fluorescein. The vision was finger counting at ten feet. The general appearance of the left eye was similar to that of the right, except that the eye was more acutely inflamed, the patches of exudate in the cornea being larger and the blood vessels more numerous. The vision of this eye was finger counting at six feet. There was no definite pain in either eye, but photophobia and lacrimation were marked. A Wassermann was negative, as was a general examination by an internist. Injection subcutaneously of one mg. of old tuberculin produced severe general, local, and focal reactions. The focal reaction was so intense, that for twenty four hours the eyelids could not be opened voluntarily. The patient had been put on tuberculin injections starting with 1/10,000 of a mg., and increasing to about 1/1,000 of a mg. On account of a focal reaction which followed this dosage, the treatment had been omitted for a while, and resumed with a dose of 1/2,000 mg.

Discussion. E. T. Boyd, Denver. I have generally had better results by starting with a dose of 1/40,000 or 1/50,000 mg.

F. R. Spencer, Boulder. We have been using very small doses, but usually the internist has given the treatment for us. Some men who have had a good deal of experience seem to think that a focal reaction is not entirely undesirable, and that the eye may improve more rapidly after such a reaction. I feel that Dr. Darrow is quite justified in continuing tuberculin.

G. F. Libby, Denver. For further stimulation of the cornea, I suggest light in some form. I should not hesitate to expose to sunlight, laterally rather than directly thru the pupil.

A. C. Magruder, Colorado Springs. We usually start with 1/20,000 mg. of old tuberculin. There have been three cases of rather severe conjunctivitis from the Finsen light in Colorado Springs, and I should be careful about using the Finsen light on the eye.

W. H. Crisp, Denver. In cases which I have handled, the pathologist has followed the practice of using minimal doses, increasing occasionally to the point of a slight reaction, and then staying at the same or a smaller dose for a while before increasing again. I believe that a slight reaction is often beneficial.

Burn From Welding Compound.

W. C. and W. M. BANE, Denver, again presented a man who had been before the society in February, 1921, on account of an injury to the left eye by a splash of hot welding compound, which burned the ocular and palpebral conjunctiva near the inner canthus. Two months after the injury the eye became irritable, and it was found that a band of scar tissue which drew the upper lid inward near the punctum was causing the cilia to rub on the eyeball. Since then the patient had been bothered very little by the eye. Now, after an interval of nine months, so little deformity had resulted that it seemed unnecessary to consider any plastic surgery for the case.

Discussion. J. M. SHIELDS, Denver, had recently had a similar case, in which three symblephara had formed.

E. R. NEEPER, Colorado Springs, suggested that it might be possible to give the patient better drainage thru the lower canaliculus, as he was moderately troubled with epiphora in the mornings.

DR. SHIELDS thought there was enough destruction of the lid margins to make the tears run out in spite of anything that might be done.

W. C. BANE. It is essential to be guarded in the prognosis of these cases, because it is impossible to say under six months how much contracture there is going to be.

Ephithelioma of the Conjunctiva.

F. L. BECK, for G. L. STRADER, Cheyenne, Wyoming, presented a man aged seventy five years, who had a growth on the right eyeball which had started about a year previously. There was some inflammation and a slight irritation, but the patient stated that the eye had never been painful. The left eye had been struck by a stone twelve or thirteen years back, and had had poor vision ever since. The vision of the right eye was hand movements, of the left eye 20/100. The right eye showed a broad elevation in the conjunctiva, apparently beginning at the outer corneal margin, extending about half way around the cornea, and averaging about five mm. across from the limbus to the outer edge of the growth. The surface of the tumor was covered with a rich plexus of blood vessels. The corneal epithelium was involved thruout. There was photophobia. The accommodation of the left eye was paralyzed, and the left lens was partially cataractous. The condition was diagnosed as epithelioma of the conjunctiva of the right eye.

Discussion. F. R. SPENCER, Boulder. Enucleation will probably not check the further growth of this tumor, but it will be necessary to exenterate the orbit. Radium would be useful, but should be used only after exenteration. Clinically the case is one of epithelioma.

E. R. NEEPER, Colorado Springs. A year ago I presented a woman with regard to whom there was a doubt as to diagnosis of an abnormal growth in the eye. Later on the eye became very painful, and another surgeon enucleated it several months ago. A pathologist opened the eye and examined it superficially; and he stated that there was no malignancy. The patient went home, and later underwent exenteration by the surgeon who had done the enucleation. The latest information about her was that she was under treatment for some mysterious liver trouble, and in my opinion she is suffering from a metastasis. In Dr. Strader's case it is doubtful whether enucleation will be sufficient.

W. A. SEDWICK, Denver, referred to a personal case in which consent had been refused for removal of an eye on which there was a growth at the corneo-scleral limbus. Subsequently enucleation, not exenteration, was done, and radium was used; but the patient later died from metastasis.

H. M. THOMPSON, Pueblo, would apply the cautery after exenteration, and then use radium.

J. M. SHIELDS, Denver, suggested that deep x-ray treatment might be more efficient than radium, on account of the rather limited range of action of the latter.

A. C. MAGRUDER, Colorado Springs, would make a microscopic examination of a portion of the tumor before deciding as to operation.

DR. NEEPER thought that if death were inevitable, the patient's departure would be rendered much more agreeable if the eye were removed as soon as possible than if the eye were left in place, with the added probability of extension to the brain together with the repulsive appearance of an ocular tumor in its later stages.

High Convergent Strabismus With Low Anisometropia.

F. R. SPENCER and C. L. LARUE, Boulder, presented a young man of nineteen years, in whom alternating convergent strabismus of approximately twenty-five degrees had been corrected by advancement of the left external rectus according to Worth's method. After the operation the patient presented himself for refraction, stating that he used his right eye for near vision and his left eye for distant vision. The right eye accepted —0.25 sphere combined with —0.25 cylinder axis 170°, the left eye —0.50 cylinder axis 105°.

Keratitis and Hypopion of Doubtful Origin.

D. G. MONAGHAN, Denver, presented a man aged forty six years who had been first seen in October, 1920, on account of a severe disturbance of the right cornea, stated to have followed injury to that eye by an insect. At that time the pain had been very severe, and the eyelids were red and swollen. There were photophobia and lacrimation. The cornea was hazy and looked as tho the epithelium had been rubbed off. Under homatropin and applications of silver nitrat to the inside of the lids, the condition cleared up in about one week. The patient returned in June, 1921, at which time the right eye had been under treatment one month for iritis. The conjunctiva of the upper lid had the appearance of trachoma. It was red and swollen, and there was no secretion. The cornea looked smoky, and in one area was again rough as tho the epithelium had been rubbed off.

General examination was negative, except that the man seemed to be on the verge of a nervous breakdown. Nose, throat, sinuses, and Wassermann test were negative. Two infected teeth were found by X-ray and were removed, and three others were removed on account of being dead and loose. Nevertheless the condition of the cornea became steadily worse. An abscess would form in the corneal substance, would rupture, and the break would heal over. Hypopion had gradually developed. Two subconjunctival injections of 1:3,000 cyanid of mercury had been given. The anterior chamber had been opened twice on account of the hypopion. Antisyphilitic and antirheumatic treatment and tonics had been employed, and locally moist and dry heat, atropin, dionin, and silver nitrat. New spots in the cornea repeatedly formed and broke down. For several months the vision had remained fairly good, but now there was very little vision.

Discussion. W. C. BANE, Denver, suggested the use of antidiphtheric serum.

D. H. COOVER, Denver, would do a peritomy as well as using the anfidiphtheric serum. After recovery from the peritomy, he would dust in protonuclein.

E. T. BOYD, Denver, approved of the peritomy, but thought that the next operation would be enucleation or evisceration. The eye was going to be a very unsightly one, and must of necessity be sightless because of the extensive involvement of the cornea.

DR. MONAGHAN had used protonuclein on the patient once, and the next day the man returned and said that the doctor could take the eye out but he did not want any more protonuclein.

WM. H. CRISP,
Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

SEPTEMBER 13, 1921.

Injuries to Eye.

DR. E. C. ELLETT reported four cases, the first being Mr. E. M. first seen in Oct., 1899, with a history of having been struck by a chip of steel from a hammer the day before. There was a small wound in the conjunctiva down and out, and the vitreous was full of blood. This was before the days of X-ray and the presence of a foreign body could only be surmised. The eye cleared rapidly and in two weeks the vision was 15/40, and the fundus was dimly seen. The patient was not seen again until Aug., 1921. The right eye had been blind about 9 years. The pupil was filled by an organized membrane, the iris was slightly discolored and had new vessels visible on the surface. The eye was acutely inflamed. The X-ray showed a foreign body in the vitreous, but an attempt to remove it by a magnet was unsuccessful. The eye has been comfortable since this attempt, and some blood which appeared in the anterior chamber is lessening in amount. The tension is slightly elevated. The patient is shown for an expression of opinion as to what is best to do. Because of the fact that inflammation had subsided promptly, the patient's age (73), and length of time (22 yrs.), he had not advised enucleation. He had seen foreign bodies work out after remaining a long time.

Mr. M. aged 50, was cutting a log with a circular saw on Aug. 24th when the saw hit the metal carrier holding the log, and a foreign body struck him at the inner end of the left eyebrow. Vision was 20/80. The eye was normal except that a tear could be seen in the choroid in the extreme nasal part of the field, and the tension was slightly reduced. The X-ray showed a large foreign body which was supposed to be partly in the ball. An incision was made over the internal rectus muscle and the foreign body removed with a magnet without entering the eyeball. It was a piece of steel 10x4x3 m.m. Antitetanic serum was given and the eye recovered promptly.

Dr. Ellett showed a section of an eye which he had first seen in Dec., 1900, with a clean linear wound thru the ciliary region of the left eye caused by a piece of glass. The eye recovered with vision of 15/25 and a small vitreous opacity. Four years later there was a retinal detachment, retinitis proliferans, vision 20/200. June, 1921, vision was lost, tension 120, McLean, eye red and painful. Enucleated July 14th with implantation of glass ball. The other eye was normal.

Dr. Ellett showed the eye from a case of foreign body in the vitreous reported at the last meeting. The inflammatory symptoms increased with the formation of a yellowish margin in the interior chamber, and the eye was enucleated on Aug. 24th, six weeks after the removal of the foreign body. There is total detachment of the retina, and the vitreous is represented by a peculiar looking mass extending forward into the anterior chamber.

Keratitis With Increased Tension.

DR. A. C. LEWIS reported the case of J. W. F. who came nine days before, complaining of pain in right eye with vision reduced to moving objects at 3 ft; O. S. V.=20/80.

Eight weeks before, he was struck in this eye by a twig which made it pain for a few minutes only. It seemed to be quiet after that. Five weeks later the vision became bad in this eye quite suddenly. Since then he has been troubled with a dull aching pain in it, worse at night.

The cornea is cloudy and the surface is rough and appears steamy. The deeper layers seem to be clear. Pupil round, regular, 3 mm. and responds slightly to light. Reacts moderately to mydriatics and miotics. Iris appears normal, anterior chamber normal. Slight circumcorneal and conjunctival injection. Tension O. D. 55 (McLean) before using eserin.

47 to-day after using it a few days. T. O. S.=40. Media apparently clear beyond the cornea. Fundus reflex seen by transillumination on all sides.

The etiology is undetermined. It seems improbable that so slight an injury could cause this condition after five weeks time. No focus of infection found in teeth, tonsils or nose. Urinalysis and blood Wassermann negative. General health good. Tuberculin test not made.

Discussion. Drs. Simpson and Blue asked if atropin was used at the beginning, and if there were adhesions then. They think that it is a beginning secondary glaucoma.

Dr. E. C. Ellett said that corneal changes appeared to be in the superficial epithelium.

Dr. Standford thinks that there is also a punctate keratitis.

Dr. Lewis, closing, feels sure that changes are only in the superficial layers of the epithelium. He thinks that there is also a low grade uveitis, which accounts for the changes in the iris.

S. S. Evans, Secretary.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY.

November 16, 1921.

Dr. John B. Potts, President.

Atropin Conjunctivitis.

Dr. H. Gifford, Omaha, discussed the likelihood of confusing such a case with trachoma, when the previous history is not known. In his experience, the substitutes for atropin, duboisin and scopolamin had produced the same reaction as atropin in susceptible individuals, so in cases like this when mydriasis is required to keep the pupil from becoming bound down, he continues the atropin in spite of the presence of atropin conjunctivitis. The patient also showed an acute **iridocyclitis,** the result of partial absorption of a traumatic cataract. After an injury two years before, he developed a cataract which had remained quiet for some time after being needled. It then had a succession of attacks of acute inflammation, evidently due to absorption of the lens material. During some of these attacks, he showed hypopyon. When this was removed on one occasion, culture proved to be sterile, so it was evidently a purely chemical irritation. Dr. Gifford has seen several cases like this as an episode in what he has reported as spontaneous cure of senile cataract.

Concussion Injury.

Dr. F. W. Dean, Council Bluffs, showed the photograph of a patient who had been shot in the right temple with a loss of sight in both eyes, about one year previously. The bullet was seen to be pressing in the upper cul-de-sac and was removed. Dr. L. B. Bushman stated that he had seen this patient at the time of the injury, and that the right eye was entirely collapsed, due evidently to rupture from concussion at the back of the eye. The optic nerve of the left eye had evidently also been cut by the bullet. Dr. H. Gifford had also seen the patient and said that it presented a typical rupture of the globe by contrecoup, the anterior part of the eye not having been touched by the bullet.

Discussion. Dr. S. D. Maiden told of a case seen in the army, in which one eye had been destroyed by a bullet and the other eye was said to be entirely blind. The patient was complaining of pains in the head. X-ray revealed a large fragment of the shell in the apex of the orbit, protruding into the sphenoid. When this was removed thru the nose, the pain ceased almost at once, and vision gradually began to return in the eye, until when last seen, he was able to read large print and recognize people easily.

The rest of the evening was devoted to reports from members who had attended the meeting of the Academy at Philadelphia; Drs. H. B. Lemere, S. R. Gifford, A. R. Knode, C. T. Uren, J. M. Patton, and C. Rubendall.

Sanford R. Gifford.
Recording Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

October 24, 1921.

Dr. Ephraim K. Findlay. President.

Skin Grafts for Cicatricial Orbit.

Dr. Harry Woodruff presented a patient upon whom he had performed skin graft for a cicatricial orbit. The patient suffered the loss of her eye from a lime burn in childhood. At the time of the operation, the patient still had the stump of an eye which was enucleated. Skin grafts were put in by the well known method of placing Thiersch grafts on plates of lead or tin and fastening them in an artificial culdesac.

Physiologic Hyaloid Artery Remnants.

Dr. Robert Von der Heydt: When remnants of the hyaloid artery are seen by focal illumination with the ophthalmoscope they are considered persistent in the sense that nature has not fully completed the absorption in the normal manner. Very decided cases of this kind are often associated with various other congenital ocular malformations.

The hyaloid artery is carried forward to its expansion on the posterior capsular surface of the lens in the third month of fetal life. At birth, according to Parsons, the whole of the vitreous lental system of blood vessels has become absorbed and has disappeared. That this was not quite true has now been disclosed by the Gullstrand slit lamp in conjunction with the binocular microscope, in observing the living eye.

A very large percentage of normal eyes show a long spiral formed vessel remnant attached somewhat nasally and downward from the lens center on the posterior capsule. This physiologic remnant hangs downward in the now definitely discernible optically empty posterior lental space, first described by Berger. This space, as can be easily observed, is quite a large and deep one, not as mentioned by Salzmann, a capillary slit. On motion of the eyeball, the lower free end of the spiral remnant is seen to gyrate or swing freely. At times the spiral elongates to quite a degree during this movement.

That we are dealing with the physiologically natural disposition of this remnant and not with an occasionally pathologic persistence of this vessel structure is now certain. First of all, there is found a uniformity in thickness. Secondly, the great number of instances where these structures are found in normal eyes absolutely excludes their presence as being a chance finding. At least 50 instances in youthful individuals, where the pupils were dilated incidental to refraction, have been observed within the last year in his office practice.

There can be no doubt that this delicate structure is destroyed in the process of fixation and hardening incidental to the preparation of specimens for histologic examination. Other structures that did not withstand this process of preparation have been observed in great numbers by examination of the living eye with the slit lamp under high magnification. Among these it is interesting to mention the various types of vacuole formation within the lens structure, subcapsular in location, and the physiologic and pathologic dew like changes in the cornea. We commonly find star shaped pigmented remnants of the pupillary membrane on the anterior capsule, and exceedingly often delicate cotton and spider web like remnants, attached to the iris and floating with free ends in the aqueous. These latter are found in about one-third of all eyes, tho not as frequently in old age.

Why do we find these remains of the hyaloid artery in some eyes and not in others? Why, when found, are they always bilateral?

There are several factors which predispose to their finding final lodgement in the postlental space. First, we must assume that in order to make their appearance within this space, a comparatively central or more posterior severance of this vessel must occur. This was proven for, when found, they were all quite long. It seemed quite likely

that during the growth of the eyeball the vessel remnant was drawn taut. At the time of the rupture, for this reason, it was projected toward the lens. This tension seemingly also accounted for the spiral and curled up form always assumed by the hyaloid artery remnant.

If the point of separation was anterior and there was space present within the posterior canal, the longer end might for the same reason normally gravitate toward the nerve head attachment, where he anticipated it might be found in many cases, were we to succeed in making better observations and penetration by focal light into this area. It must, however, be remembered that in this area the increased reflection from the retina and luminous nerve head might be sufficient to obscure this delicate structure. In the anterior situation behind the lens it was visible only when under direct focal illumination.

As a patency of the canal of Cloquet is necessary for a successful gravitation, the normally variable fluidity of the vitreous within certain limitations would not be a factor favoring its appearance or absence, except that possibly its swaying motion might aid dislodgment.

In order to expect to find the artery remnant posterior to the lens, it therefore was necessary that a somewhat posterior separation occurred, and the canal be open and free to admit of its gravitation. A certain position of the fetal head in utero probably favored the gravitation toward the postlental space, at the time of the splitting of this vessel remnant, a third and important factor, contributing toward the creation of this new and interesting histologic finding.

Affections of the Eye Induced by Undue Exposure to Light Rays.

Professor J. Van der Hoeve, of Leiden, Holland, said this topic was of sufficient importance to reemphasize some of the points he had previously brought before the profession. (Amer. Jour. of Ophth. v. 3, p. 178).

Formerly, lack of illumination in schools and in factories was spoken of, and ophthalmologists went around with photometers to determine if in different places the scholars, the workers in factories and other industrial establishments had sufficient light. Today every school and every factory has the necessary amount of light, and we do not think so much about a lack of light as we fear that the artificial light sources are so strong as to effect the eyes. It is very well known that undue exposure to light, either natural or artificial, is a factor in causing many ocular disturbances.

In Europe, during eclipses of the sun in the last ten years, hundreds and perhaps thousands of people had damaged one or both eyes in staring at the sun with their eyes wholly unprotected or imperfectly protected.

Regarding the different parts of the spectrum which can cause disease, the infrared rays have been the least studied. Vogt attributes to them the causation of glass workers' cataract. The visible rays are generally considered to be the cause of eclipse blindness. The effect of the ultraviolet rays on the eye is that which has been the most studied, especially in the last fifteen years.

Not all the ultraviolet rays, which fall on the eye, are transmitted. The different media absorb a great part of them. Numerous experiments have been conducted to determine the absorptive capacity of the various structures of the eye for ultraviolet rays; and altho the results of the observations and investigations of different men are somewhat at variance, it is known with certainty that the cornea and lens in particular partially absorb the ultraviolet rays.

The experimental work of Parsons shows that the cornea absorbs all rays beyond 295 millimicrons completely, and has no absorptive capacity for rays of greater wave length; whereas the lens completely absorbs all rays beyond 350 millimicrons. The line is not a sharp one, absorption commencing at about 400 millimicrons. There are lenses which beyond 400 millimicrons absorb completely. Hallauer found youthful lenses which trans-

mitted rays of 310-330 millimicrons, and Schanz a juvenile lens, which transmitted rays from 300 millimicrons upwards.

From these results it is known that when ultraviolet rays fall on our eyes, the surface is reached by rays of every possible wave length, the iris and lens by rays from 295 millimicrons upwards, the retina as a rule only by rays from 350 millimicrons upwards, in some cases from 300 millimicrons, and in others 400 millimicrons and upwards.

As a typical instance of the effect of natural light rich in ultraviolet rays on the human eye there is the well known snow blindness. As sources of artificial light of this kind, which can damage the eye, the author speaks of arc lamps, mercury vapor lamps, electric welding, short circuit flashes, etc. Changes by lightning are generally attributed to other causes.

One of the first affections which the human eye suffers from natural and artificial sources of light rich in ultraviolet rays is photophthalmia, which is characterized by intense photophobia and lacrimation, with frequently blepharospasm and ciliary neuralgia. There is acute conjunctivitis, and in the severest cases the cornea and iris may be involved in the inflammation. The inflammation of the superficial parts of the eye is generally attributed to the shorter waved radiation, whereas the affection of the inner eye is caused by the longer waved ultraviolet rays and the light rays. This difference is probably the cause of the two different kinds of snow blindness that we distinguish, one with a preponderance of the external disease of the eye, the other with a preponderance of the internal disease of the eye, which may be found separate or together, according to the presence of rays of shorter or longer wave length, or of both.

Birch-Hirschfeld has found that the posterior layer of the iris can be seriously damaged, and that the ciliary processes show hyperemia, hemorrhages, swelling and desquamation of the epithelium, and inflammation with fibrinous exudation in the anterior and posterior chambers. The inflammation of the eye was especially developed in the ciliary processes; the choroid showed hyperemia. In the retina this author found degeneration, especially when the eyes were aphakic. Nearly every part of the eye can be damaged by light rich in ultraviolet rays. It is known that in sunlight and in diffuse daylight many ultraviolet rays are present, especially those with a wave length between 300 and 400 millimicrons. In the last twenty-five years the range of rays emitted by artificial lights contains more ultraviolet rays than formerly. Consequently during the whole day, at least as long as our eyes are opened, they are irradiated by light rich in ultraviolet rays—sunlight, diffuse daylight, artificial light—therefore the fear is justified that this may damage our eyes.

Daland in 1917 pointed out that the Eskimos on the coasts of Alaska, Siberia and the islands of the Behring Sea, and Artic Oceans suffered very much from snow blindness even on cloudy or dull days. Many Alaskan pioneers have suffered snow blindness by dispensing with goggles, under the conditions, believing that they were safe as long as the sun was hidden by clouds. The experience of the Eskimos is sufficient to prove that diffuse daylight may damage the eyes, so that light sources and goggles cannot be called ideal, which make the light equal to diffuse daylight. The Eskimos show conjunctivitis, cataract, trachoma, and snow blindness as common ocular diseases. The conjunctivitis and snow blindness may be caused by the ultraviolet rays. Relative to cataract, it is an open question whether it can be caused by ultraviolet rays.

In 1898 Hirschberg pointed out that in India senile cataract becomes mature about twenty years earlier than in Europe. Whereas in his clinic in Berlin cataract comes to operation at an average age of 62 years, he saw in the hospitals of Calcutta, Jaipore, Bombay, that Hindus were operated for senile cataract about the age of 46

years. Hirschberg attributes this early maturity of the cataract to the heat of the sun, but Professor Van der Hoeve says it may just as well be ascribed to the other rays of the sun. Snell seems to agree with Hirschberg in regard to the age of the cataract patients who come to operations in Europe. Hirschberg found in Germany an average of 62 years for senile cataract, and Snell found about the same age even in bottle makers. Brockman gave to Snell the following statistics about the age at which he operated cataract in India:

In Snell's statistics (England) the age of operation is in 78 per cent. between 51 and 70 years; in Brockman's (India) in 75 per cent. between 40 and 60. Whereas in Snell's statistics the decennium 61-70 contains 47 of the 78 per cent., in Brockman's statistics the decennium 51-60 only 40 of the 75 per cent. We can draw from the two sets of statistics only the conclusion that in India, where Brockman operated, senile cataract comes to operation more than ten years earlier than in Sheffield. Snell tries to explain this fact by the earlier maturity and short lives of the Indian natives, but the fact remains that in India cataract is earlier than in Europe.

According to certain observers, if ultraviolet rays cause cataract, people who live in high regions would have more cataract than other people, and this is not known to be the case. Light certainly in the mountains contains more ultraviolet rays than in lower regions because the diffusion of light is less in the higher regions. But this increase of ultraviolet rays is greater for the rays of shorter wave length, than for those of longer wave length, and it is known that they first cause irritation of the eye and photophthalmia, so that the eyes must be kept more closed or be protected by goggles; in both cases the number of rays which reach the lens will be diminished.

If light is a factor in the origin of cataract, it is only one of a great many factors, which act on the whole organism or on the eye alone. That light is a principal factor in the origin of senile cataract is rendered highly probable by established facts.

How is it possible that light, rich in ultraviolet rays, damages the lens so that senile cataract occurs? The opacities obtained have nothing to do with senile cataract, which almost never begins in the pupillary part. Just like the epithelium of the conjunctiva and cornea, the capsular epithelium too may be damaged directly by relatively short exposure to extremely strong light, rich in ultraviolet rays.

The author put forward the hypothesis in 1912 of how it is possible for the ciliary body to be damaged when the eye is exposed to light, especially rich in ultraviolet rays, which could cause senile cataract. In snow blindness the ciliary region shows tenderness, when it is touched, and the patients suffer from severe ciliary neuralgia. The ciliary processes are damaged, but how is this possible? The ciliary processes are well protected from the influence of light, by cornea and iris, by conjunctiva, sclerotic, the muscular part of the ciliary body, and the pigment layer. The author pointed out that the lens is optically heterogeneous, not homogeneous.

By the expression optical heterogeneity is understood that there are present small particles which when light falls upon them, become light sources themselves *and disperse the light on all sides.* Optical heterogeneity is best known by the fact that a sunbeam falling thru a narrow slit into a dusty room can be seen from every side, because every particle on which the light falls, spreads the light on all sides.

Fluorescence is the quality of a substance that every part of the substance becomes, if light falls on it, a source of light itself which spreads the light on every side. In contrast to diffuse light the wave length of the fluorescent light is different from the wave length of the light which causes the fluorescence.

If the ultraviolet rays are less in number and the light which strikes our eye is not so intense, no inflammation will occur; but the continual everlast-

ing radiation of the few ultraviolet rays on the ciliary processes will be able in the lapse of years to cause changes in the epithelial cells, so that the secretion is changed a little. Even a very trifling alteration of the aqueous is sufficient to cause malnutrition of the lens which may, in the course of fifty years or more, lead to obscuration of the lens, to senile cataract. When the diffusion of the lens is so strong that cataract ensues, it is probable that the pupillary part of the iris, and perhaps even the posterior layer of the iris will suffer too from the radiation of rays of short wave length, altho they are much more resistant than the ciliary epithelium.

Is there any affection of the retina known which can be due to the ultraviolet rays, and can be compared to the senile cataract? The author thinks we have such an affection in the senile degeneration of the macula lutea, which appears as a rule after sixty years, and becomes more frequent the older people are. With reference to cataract, the author has never found a degeneration of the macula directly after the extraction of senile cataract; and in the records of about 500 cataracts operated on in the last twenty or more years he has not found one case.

It was pointed out some time ago, that when the possible effect of ultraviolet rays was very much overrated, it was proposed to make windows of protecting yellow green glass, to cover every artificial light with them and to wear goggles. The author does not think now that anybody will be so afraid of those rays as to condemn people continually to wear protecting goggles, and he thinks also that it is not at all essential to protect our eyes continually. People in a normal condition might wear one of the protecting kinds of goggles, only when they are more than usually exposed to ultraviolet rays, i.e., on sunny days at the shore, or on the river, or on strongly reflecting roads and places on ice and snowfields, in hunting, in the fields, etc. Those people who have to labor continually in the vicinity of lamps which irradiate many ultraviolet rays will do well to cover the light with one of the protecting glasses. While light rich in ultraviolet rays is a prominent factor in the origin of cataract and degeneration of the retina, it is only one of the numerous factors which may have an influence on the origin of these diseases.

Discussion. Dr. E. V. L. Brown stated that in those eyes which developed cataract, there was not only a change in the ciliary epithelium but also some change in the pigment area itself, and perhaps these rays came from behind rather than from in front, as Professor Van der Hoeve had explained.

Dr. William A. Fisher asked: Supposing that in a few sections of India the excess of heat is the cause of cataract, why are there not more cataracts in proportion to the inhabitants in the southern part of India than in the northern part? From the northern part of India a larger number of cataracts were reported than from the southern part; therefore, cataract must be more frequent among the population in the northern part than in the southern part. Why should the proportion not be equally as high or higher in the southern part where it is hotter? In India children 13 and 14 years of age were mothers. They developed earlier, and naturally they must have cataract earlier. Strange as it would seem, there were very few patients in India operated on for cataract who really knew how old they were.

Professor Van der Hoeve, in closing the discussion, and in replying to Dr. Brown, stated that it was possible the changes in the pigmentation of the iris came from the anterior also, and that there were more ultraviolet rays from the anterior part than the posterior part. The posterior layer was always diseased in cataractous eyes. The posterior rays would seem to have a peculiar influence on the structures within the eye.

He agreed with Dr. Fisher that it was difficult to determine the ages of Indian people. Major Smith and Elliot maintained that cataract occurs earlier in the Indian people than in

others. Cataract was seen in people of 30 to 40 years of age.

As to cataract being more frequent in the northern part of India, he did not believe the heat of the sun had much to do with it. In the Eskimos, who were exposed to the strong rays of the sun, cataracts were very frequent, and they received more ultraviolet rays in the polar regions and in the equator than we did.

ROYAL SOCIETY OF MEDICINE.

Section on Ophthalmology.

October 14, 1921.

Dr. James Taylor, President, occupying the chair.

Models Illustrating the Development of the Human Eye.

Miss Ida C. Mann showed a series of well executed models to illustrate the development of the eye. For teaching purposes she regards them as superior to ordinary book illustrations.

Probable Implantation Cyst.

Mr. L. Fleming exhibited a girl who, 18 months ago, received an injury to the eye. When she was seen six months after the receipt of the injury, there was a perforation at the limbus, the iris was adherent, and there was active iritis present. Six months later, a small nodule appeared at the nine o'clock position, but since that date there had been no appreciable increase in size.

Discussion. Mr. Treacher Collins did not feel certain as to its nature, but suggested that the diagnosis might be helped by employing contact illumination.

Gray Mass in Vitreous.

Mr. Bookless showed a child with a gray mass in the vitreous, with arborization of vessels visible at the back of the lens. A week after being seen, a small nodule appeared on the back of the iris. This had progressively increased, and vision was reduced from 6/36 to perception of fingers at a distance of a few inches. The diagnosis seemed to rest between a congenital abnormality and malignant disease.

Discussion. Sir William Lister considered that it was a cyst of the iris, with a membrane which had formed after the occurrence of hemorrhage in the vitreous. He did not regard the condition as malignant.

Mr. M. S. Mayou referred to a case he showed at a previous meeting, in which there was a similar appearance, but without a membrane. He agreed that the present case was one of cyst of the iris.

Mr. Treacher Collins considered that the primary factor was the cyclitis, which had produced a cyclitic membrane. This membrane probably caused an arrest of lymph circulation, which had resulted in the separation of the two layers of pigment at the back of the iris, a cyst having been caused by that. He advised puncture of the body, which, he thought, would probably bring about its collapse.

Case of Benedict's Syndrome.

Dr. Wylie sent and Mr. Leslie Paton demonstrated, a case of Benedict's syndrome. The lesion was supposed to be in the red nucleus, catching the fibers of the third nerve.

The Fourth Cranial Nerve.

Mr. J. Herbert Parsons, F. R. S., gave a contribution on what he termed the riddle of the fourth nerve, the only nerve which had, in a complete sense, a dorsal decussation. It was probable, he said, that there were no decussating fibers within the central nervous system other than those passing out in the trunk of the nerve. A peculiarity of the fourth nerve was, that it was purely somatic in mammals; it supplied purely somatic muscles, and had no visceral fibers. There was an absence of experimental lesions in this neighborhood sufficiently exactly localised to produce definite results. Explanation, therefore, must be sought in comparative anatomy and embryology. The 4th nerve existed all along down to the lowest vertebrates; as shown in a slide it was found even in the lamprey, in which animal the eyes were very degenerate organs. The 4th decussated dorsally, going thru the anterior medullary velum in that animal, exactly as in the higher vertebrates. He exhibited slides illustrating the work of Davidson Black, showing the position of the

nuclei of the cranial nerves and their points of exit from the central nervous system. The same kind of thing was seen in various specimens of amphibiae. Cappi believed that migration of motor nuclei was especially associated with chemotaxis, due to the attraction to foci of incoming afferent impulses; and the last edition of Sir Arthur Keith's "Embryology" explained the 4th nerve as due to neurobiotaxis, but as to this view Mr. Parsons expressed his scepticism. Still, there was no doubt of the fact that in the evolutionary process the afferent side became evolved very much in advance of the motor response. Mr. Parsons pointed out the near association of the fibers of the 4th nerve with those of the 5th nerve at a very early stage of their development, both as to the relation of their branches and in regard to the ciliary ganglion. Investigation of the chief ganglion of the 4th nerve showed that it did not migrate from the motor part, but developed from the cells which were on the neural crest. There could be no doubt that this ganglion on the 4th was a posterior root ganglion, and that, certainly at this stage, the 4th nerve had motor somatic fibers in addition to sensory somatic fibers. He showed that complex synergic movements existed, brought about by nerve nuclei, with fibers which were presumably decussated, and which were correlated with each other in a remarkable way in the absence of cerebral hemispheres. Therefore, it must be concluded that even at a low stage there was an arrangement for coordinating the synergic movements of the eye muscles. Coordination was usually regarded as entirely cortical, and sufficient stress had not been laid on lower coordination centres. This idea did not detract from Hughlings Jackson's view; it merely divided Jackson's "top story" into a series of flats.

Dr. Gordon Holmes discussed the contribution.

Milestones in Refraction Work.

Mr. Ernest Clarke read a paper on this subject, based upon forty years of ophthalmic work. He said that at the date he commenced to practise, it was rare to correct any astigmatism under .50 D., or 1/80th of an inch. He passed his first milestone when, in his first year, he attended Donders' clinic at Utrecht, where more attention was being paid to refraction. In the Netherlands the diopter was thoroly installed, whereas in London oculists were still prescribing in inches. An enormous debt was due to Donders for clearing up the subject of refraction and raising that department to a scientific level. His work, published in 1864, is still a classic, and tho some of the statements had since been amplified, none had been negatived. At that date, too, retinoscopy or skiascopy had not become universal. The realization of the all embracing and deleterious effects of eyestrain had taken many years, it was now known that there was scarcely any nerve trouble which might not be due, in whole or in part, to eyestrain. In this matter it was the small errors which counted. Still, symptoms commonly attributable to eyestrain might owe their origin to nasal or dental trouble. The skilled ophthalmologist would look for extra-ocular as well as ocular causes. If a young person had an error of refraction, the correcting glasses should be worn always in the house, tho not necessarily at games out of doors. If this were done, the tendency was for small errors to disappear. Admittedly the wearing of glasses by the public school boy was a great disability.

Donders proved that presbyopia was not the opposite of myopia. Mr. Clarke had collected the records of 750 cases of myopia observed by him in the last 14 years. No case of high myopia with fundus changes was included, and all the cases given were treated by full correction, only allowing weaker glasses for near work in patients who were approaching the presbyopic period. The results were as follows: 101 showed a decrease in the myopia with the advance of age, and of these, 83 were over 30 years of age; 379 remained stationary, and of those, 306 were over 20 years of age. In 141 there was an increase in the myopia up to, but not exceeding, 0.50 D.; 129 increased in myopia 0.75 or more, and of

these 78 were under 15 years of age. Only 16 of the 750 increased over 2. D., and the maximum of 4 D. was reached by 5 patients. The common sense treatment was to try to make the patient normal by giving full correction of the myopia, and insisting that the glasses should be worn for every purpose within doors; in this way the ciliary muscle was trained to do its proper work without undue convergence. Donders' best work was, probably, in association with presbyopia, yet it took years for his teaching to bear fruit. Every presbyope must be carefully examined, his static refraction ascertained, also his accommodation power and with that knowledge one could safely give him an addition for near work. The correct treatment of presbyopia was one of the most important duties of the oculist, because these patients had arrived at a critical period of life, when they had many worries, and often were subjects of intestinal toxemia, making it necessary to stop every channel of nervous waste. If it were found, by static refraction, that eyestrain was present, distance and near glasses should be prescribed.

Mr. Clarke had seen a great change in the attitude towards cycloplegics. In early days atropin was the drug used, and at that date it was used excessively, but only for the young. To arrive at the truth it was necessary to test with and without a cycloplegic. He had done that in reference to a large number of patients; i. e., he put the patient thru a complete objective and subjective examination and selected the glasses, then he had put him under atropin, or homatropin, and put him again thru examination. In some of the cases the cycloplegia revealed nothing new, tho in a large number it showed an important difference, a difference which would decide between success and failure in treatment. The oculist's note book should record patient's static refraction, and in the majority of cases that could only be got, in a patient under 40 years of age, by using a cycloplegic. Once he had a record of a patient's static refraction, he did not again put that patient under atropin. In the whole 40 years he had never had a case of glaucoma produced by a cycloplegic.

With regard to heterophoria, he spoke highly of Maddox's useful glass rod test. He agreed with Maddox's opinion that small heterophorias tend to disappear when the error of refraction is properly corrected and the glasses worn. He referred also to the great improvement in the treatment of squint in recent years. He had praise for Meyrowitz's latest model of ophthalmometer; it was, he said, a very accurate instrument, and a time economiser. He touched also on the types of trial frames, and concluded with a comment on the three cardinal maxims which were given him by his old master Luther Holden: (1) Think of your patient first; (2), think of your profession second; (3), think of yourself last.

Discussion. Dr. McCrea, speaking as a physician, emphasized Mr. Clarke's remarks as to the need for correcting slight errors of refraction; he had found them a prolific cause of the commonest symptom encountered by physicians, headache. With regard to cycloplegics, he, the speaker, did not care to read a report on a patient under 45 on whom a cycloplegic had not been used. He thought physicians should get more frequently into touch with such specialists as ophthalmologists.

Mr. Harrison Butler said he now seldom used mydriatics, and he believed he was getting considerably better results; his change of view he owed to his lamented friend Devereux Marshall. He suggested that some of the younger men might investigate how far the statement that the eyes were always changing with advancing years was true. He had discovered that certain patients got an alteration of the angle of astigmatism from time to time. With a certain type of cornea slight alterations might occur which varied the intraocular tension.

Mr. Ernest Clarke, in his reply, said he was certain the refraction was constantly altering.

H. Dickinson.

SPECIAL REPORT

BUTYN, A NEW SYNTHETIC LOCAL ANESTHETIC: REPORT CONCERNING CLINICAL USE.

ALBERT E. BULSON, JR., M.D.

FORT WAYNE, IND.

Special reports of the committee on local anesthesia of the section on ophthalmology of the American Medical Association.

Council on Pharmacy and Chemistry of the American Medical Association—Gentlemen:

At your request the committee secured some samples of butyn, a new local anesthetic, which the manufacturers, the Abbott Laboratories, provided, and submitted it to animal experimentation and clinical trial. These experiments were begun several months ago by the individual members of the committee, and up to the present time seem to have been sufficiently extensive and conclusive to justify the report herewith submitted.

Tho the committee was supplied with samples of powdered butyn, it was thought best to follow the suggestions of the manufacturers and experiment with a 2 per cent. solution, and later, under appropriate precautions, use solutions of great concentration. Accordingly, this report, except where otherwise noted, applies to results as obtained with the 2 per cent. solution.

In accordance with your suggestion, we recorded our observations as follows, anesthesia, including onset, depth, penetration and duration; side actions, including immediate and late irritation, changes in pupil diameter, vascularity, intraocular pressure, desiccation of cornea and other side actions; toxic systemic effects, and comparative value in ophthalmic work, including major as well as minor operations. Under these various headings our observations are as follows:

ANESTHESIA

Repeated trials indicate a striking rapidity of anesthetic action, as indicated by the fact that one minute after one instillation of a 2 per cent, solution of butyn in the eye, surface anesthesia is sufficient to permit of touching the cornea or removing superficially placed foreign bodies without discomfort, This surface anesthesia lasts from fifteen to twenty minutes, when, in the average case, it begins to subside. Occasionally the anesthesia has been noted for from twenty-five to thirty minutes. The depth of anesthesia produced by one instillation is not sufficient for operations, or for even the removal of deeply embedded foreign bodies in the cornea. It is, however, sufficient for the painless extraction of superficially placed foreign bodies, the application of irritating astringents, and the determination of intraocular pressure with the tonometer. When the number of instillations is increased, there is a marked increase in the depth, degree and duration of the anesthesia.

For operative work the committee has followed the plan generally used when cocain is the anesthetic employed, which consists in four instillations, three minutes apart, the operative work to be begun from five to ten minutes after the last instillation. This method resulted in the production of an anesthesia deep enough and complete enough for all of the commoner major operations on the eye, with the exception of enucleation, which up to the present time has not been performed under butyn anesthesia by any member of the committee. The height of anesthesia appears to be secured at about five to eight minutes after the fourth instillation of the anesthetic, and its duration is from twenty to thirty minutes in the average case, tho

frequently lasting much longer, and in a few instances even the surgical anesthesia has lasted for nearly an hour.

SIDE ACTIONS

One instillation of a 2 per cent. solution of butyn almost invariably produces a mild hyperemia of the conjunctiva. This hyperemia is not noticeably increased by subsequent instillations of the anesthetic. It is controlled readily by epinephrin solution, or may be averted by combining epinephrin with the butyn. When epinephrin is not employed, the hyperemia gradually disappears in from thirty to sixty minutes. The hyperemia seems to be more marked and of longer duration in diseased eyes, even tho the active stage of disease has passed.

Butyn solutions do not affect the pupil diameter in any way, and produce no change in the intraocular pressure. There also is no desiccation or disturbance in the nutrition of the cornea, so far as has been determined. We also are of the opinion that butyn solutions do not deteriorate rapidly, even when exposed to air and light, nor is their anesthetic efficiency impaired by boiling.

TOXIC SYSTEMIC EFFECTS

In beginning the use of butyn, we were confronted with the statement of the Research Committee of your Council to the effect that butyn is two and one-half times more toxic than cocain when injected hypodermically into albino rats, and that the lethal dose of butyn when injected intravenously into cats is about equal to that of cocain. One member of our committee, Dr. H. M. Langdon, in conjunction with Dr. Herbert Fox, director of Pepper Clinical Laboratory of the University of Pennsylvania, has conducted some animal experiments with a view to determining the toxicity of butyn, and the result of those experiments confirmed those of the Research Committee of your Council. The manufacturers state that their animal experiments substantiate these findings.

However, in no instance, including the hundreds of times that butyn has been used by the members of the committee for minor as well as major operations on the eye, as well as in operative work in the nose and throat, have the slightest systemic toxic manifestations been noted. Following the report that surgeons and dentists had freely used butyn for surface and infiltrative anesthesia with no toxic results, some of the members of the committee have used butyn in paste and in concentrated solutions as a topical application for operative work in the nose as well as in the eye, with no evidence of toxic effects. The committee, in comparing the effects on animals and men, is inclined to believe, as suggested by Professor Sollmann of your Research Committee, that there may be (1) differences in absorbability from mucous membranes; (2) different ratio of toxicity in man and animals, and (3) different frequency of idiosyncrasies. It is probable that if butyn is used as extensively as cocain, there will be cases of toxic effects reported, and then it is a question to decide whether the symptoms are due partly to psychic causes, to idiosyncrasy, or to error in using more of the drug than required to produce the desired effect.

COMPARATIVE VALUE IN OPHTHALMIC WORK

In the use of butyn as a local anesthetic, cocain is used as a comparison, and our committee is unanimous in the opinion that butyn for purely surface anesthesia for minor operations is superior to cocain, for the reason that it acts more quickly, fewer applications are required, there are no objectionable side actions, such as dilatation of the pupil or desiccation of the cornea, and the anesthesia is more profound. For producing surface anesthesia for the removal of foreign bodies from the eye, the application of irritating astringents, estimating the intraocular pressure with the tonometer, or for any of the minor opera-

tive procedures, butyn solutions seem to be very useful.

For major operations, particularly those requiring opening of the eyeball, such as iridectomy and cataract extraction, the technic usually employed in obtaining a cocain anesthesia is employed in obtaining butyn anesthesia. The use of a 2 per cent. solution of butyn results in a more profound anesthesia than is obtained with a 4 per cent. solution of cocain, and without any objectionable side actions. For operations on the extrinsic muscles of the eyeball, the results are equal to those obtained with cocain, tho the committee believes that a solution stronger than 2 per cent, may be preferable.

INFILTRATION ANESTHESIA

In view of our understanding that butyn might prove quite toxic, we did not at first use butyn for the production of infiltration anesthesia, and only recently have we undertaken some experimental work, using both 0.5 and 1 per cent, solutions for the purpose. While our experience is limited, up to the present time we have had very satisfactory results. A 0.5 per cent. solution of butyn has been injected rather freely into the tissues for the purpose of doing advancements of the extrinsic muscles of the eyeball, for the opening of abscesses in the orbit and the appendages, and as an adjunct in operations in which the eyeball is opened. In the few cases in which this has been tried, a deep and satisfactory anesthesia has been secured. A more comprehensive report covering infiltration anesthesia with butyn will be made later, and will form a part of the committee report to be presented before the Section on Ophthalmology of the American Medical Association.

BUTYN IN NOSE AND THROAT WORK

The chairman of the committee has used butyn solutions as a routine for several months in nose and throat work, and the results, in brief, are considered worthy of being a part of this report, as they bear directly on the question under consideration.

The recognition of the fact that the nasal mucous membrane possesses greater area and increased absorbing surface, as compared to the conjunctiva, made it advisable to begin with weak solutions and use smaller amounts until the toxicity in the average human being could be determined. Therefore, at first one application of butyn in 1 per cent. solution was made over small areas within the nose, and tests for anesthesia were made subsequently at intervals of from one to three minutes. These tests indicated a mild surface anesthesia produced within one minute. Later these tests were extended to include surface anesthesia sufficient for everything pertaining to an examination, including the use of applicators and eustachian catheters, as also for the allaying of discomfort occasioned by the use of astringents or escharotics. Finally, butyn in 5 per cent. solution was employed as a routine in producing anesthesia for all of the major intranasal operations.

As butyn produces no ischemic effects, there is no shrinking of tissues following its use; hence the condition of the intranasal tissues remains approximately the same except for the anesthesia. This is a valuable feature in those cases in which a portion or all of a turbinate is to be removed. When combined with epinephrin, butyn in 5 per cent. solution produces an anesthesia sufficient for all of the major intranasal operations, including submucous resection of the septum, turbinotomies and intranasal operations on the accessory sinuses. Not only is the anesthesia very satisfactory, but up to the present time not the slightest toxic effects have been noted in the hundreds of operative cases in which the anesthetic has been used. Among these cases are thirty-eight consecutive submucous resections of the septum, and twenty-six consecutive intranasal operations on the nasal accessory sinuses.

The technic employed in obtaining anesthesia has been similar to that employed in obtaining anesthesia from

cocain, except that the butyn has not been used in greater concentration than 5 per cent. solutions. The anesthesia lasts from thirty to forty minutes.

EXCEPTIONS

In comparing butyn anesthesia with cocain anesthesia, the committee has discovered that occasionally a patient seems to be immune to complete local anesthesia from butyn employed in either 2 or 5 per cent. solutions. These cases are relatively few. The failure to secure complete local anesthesia in this very limited number of cases may be due to psychic disturbances or a highly neurotic temperament, or perhaps to a peculiar idiosyncrasy which makes the patient, in a measure, intolerant to the anesthetic effect of the drug.

SUMMARY OF CLINICAL RESULTS

The committee now has a detailed record of clinical experiences with butyn in the performance of several hundred major operations on the eye and the nose and throat. These include cataract extraction, iridectomy (including that done for the relief of glaucoma), trephine operation, magnet extraction of foreign bodies, tenotomy and advancement of the ocular muscles, pterygium operations, removal of cysts and other tumors from the eyeball or lids, grattage, and a few cases of plastic surgery of the lids, including the correction of entropion and ectropion. As yet no enucleations have been performed under butyn anesthesia, but we believe that such an operation may be performed very satisfactorily.

Local anesthesia is put to the best test when used for operations which involve cutting the iris or extrinsic muscles of the eyeball. The committee, December 1, had a record of thirty-nine cataract extractions combined with iridectomy, twenty-three iridectomies for glaucoma or as preliminary to cataract extraction, twenty-one capsulotomies and iridotomies, and eight muscle advancements, all satisfactorily done under butyn anesthesia. Aside from this there were a large number of other eye operations requiring less profound anesthesia, which were performed satisfactorily under butyn.

In nose and throat surgery, butyn anesthesia has been used in practically all of the major intranasal operations, including submucous resection of the septum, turbinotomies, opening of accessory sinuses (including exenteration of the ethmoid cells), tonsillectomy and adenectomy, in all numbering nearly 200 cases.

In practically all of these cases, including nose and throat as well as the eye, the anesthesia has been very satisfactory, and the few exceptions are considered exceptions such as might occur under any local anesthetic. Two per cent. solutions of butyn were used for nearly all of the eye operations, whereas 5 per cent. solutions were used in most of the nose and throat operations. If more extended experience confirms our present belief that there is little cause for apprehension concerning toxic effects from the judicious use of butyn, then a 5 per cent. solution may be the strength of concentration preferred in some of the major operations in which profound local anesthesia is desirable and has heretofore been sometimes difficult to secure.

A detailed report of each and every one of our cases would extend this report to an unnecessary length, but will be submitted if deemed either advisable or necessary.

CONCLUSIONS

The results of the clinical and experimental use of butyn seem to justify the committee in arriving at the following conclusions:

1. It is more powerful than cocain, a similar quantity being required.
2. It acts more rapidly than cocain.
3. Its action is more prolonged than that of cocain.
4. According to our experience to

date, butyn in the quantity required is less toxic than cocain.

5. It produces no drying effect on tissues.

6. It produces on change in the size of the pupil.

7. It has no ischemic effect and therefore causes no shrinking of tissues.

8. It can be boiled without impairing its anesthetic efficiency.

Respectfully submitted.

Albert E. Bulson, Jr., Fort Wayne, Chairman.
William Zentmayer, Philadelphia.
Edgar S. Thomson, New York City.
H. Maxwell Langdon, Philadelphia.
Harry S. Gradle, Chicago.

ANNOUNCEMENT

PATHOLOGIC EXHIBIT FOR THE INTERNATIONAL CONGRESS OF OPHTHALMOLOGY.

The Army Medical Museum, in connection with the Section on Pathology of the American Academy of Ophthalmology and Oto-Laryngology is preparing an exhibit of pathologic material for the coming International Congress of Ophthalmology. Owing to the short time that the Section on Pathology has been in existence, the material it already has on hand is of a necessity somewhat limited. In order to have a creditable exhibit, all American Ophthalmologists are earnestly urged to send any interesting pathologic specimens they have to the Museum; either as an outright gift, or as a temporary loan during the Congress. Such specimens should be plainly labeled, described fully, and sent to Major G. R. Callender, Army Medical Museum, Washington D. C., Section on Ophthalmic Pathology.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

THE RISKS OF OPERATION.

The case reported in the first paper of the December number brings out in striking and tragic fashion the chances for misfortune that attend every operative invasion of living tissues. But it does more than this, it illustrates how, in spite of the most intelligent and conscientious care in the application of known precautions, disaster may follow even comparatively slight operative interference; and that the careful study of such a case even after it has run its course, and with all the aids that laboratory methods can give, may still leave us ignorant of just how the untoward result was brought about.

Apparently, organisms, not pathogenic to other patients and animals, or a state of susceptibility quite unrecognizable by any known method of diagnosis and not at all to be expected, were able to destroy all the hopes of patient and surgeon. Unforeseen disaster is a possible outcome of any operation. Absolute freedom from risk cannot be claimed for any technic or by reason of any experience. The possibility should be stated to patient or friends, and placed in contrast with the certain or probable results of not resorting to operation.

But the fact that such risks cannot be wholly escaped is no excuse for failure to take every known precaution to avoid danger. Neither should the rarity of such occurrences excuse neglect of measures that will render them as rare as possible. If in spite of all precautions, such an accident will occur once in a surgical life time; and with little care would only happen twice in the same period; the greatest attention to detail would still be justified by reduction in danger. No one worthy of the name of surgeon will feel that any trouble is too great, to give the patient the best results. The surgeon is paid not to guarantee success, but to do all that can be done to secure it.

It is this duty to guard in every possible way against disaster that demands we shall not operate on both eyes at the same time. The case al-

luded to illustrates this. If both eyes had been operated on at once for unimportant pterygia, and both lost by the virulent infection, the tragedy would have been infinitely worse. The reason for doing bilateral operations is nearly always convenience. The reason for not doing them is to avoid the remote possibility of leaving the patient blind thru our interference. Such operations have often been done without harm, but no surgeon has the right to take even the smallest chance of blinding a patient; and this will happen if operating on both eyes at one time is tried often enough. A thousand operations without harm do not compensate one patient for blindness.

Operations that do not destroy the sight, but still leave the patient worse off for the interference, are not quite so bad as those involving destruction of an eye; but they are extremely discreditable to our profession. They have rather frequently been done on the eye muscles or their tendons. In these cases, bad results do not usually depend on undiscoverable factors or complications that could not be foreseen. They depend more on ignorance of the complicated problems involved in any operative interference with the functions of these muscles; and on recklessness that is willing to take chances of being right, without the trouble of thoroly studying out all the conditions present. A generation ago there were patients going about whose convergent squint had been converted into wide divergence of the visual axes, by tenotomy, often repeated without even a trial of glasses. There are now patients without such noticeable cosmetic defects, whose headache and neurasthenia have been made more burdensome and permanent by elaborate and carefully performed advancements, that seemed to reduce greatly the heterophoria, but produced unfamiliar coordinations with which the weak nervous system was unable to deal.

When the operation has been wisely decided on, well chosen and skillfully performed, the patient has enough risk to run in the uncertainty of the perfection of its result and the possibility of disaster. The latter should be reduced to the extreme minimum; by careful consideration of all suggested preventives of infection, by the working out of an individual technic of which the surgeon is completely master, and by its conscientious application in every case, no matter how remote the apparent risk from omission of any detail. Only then can patient and surgeon face calamity with the feeling that all has been done that was humanly possible to prevent or minimize it. E. J.

THE OFFICIAL LANGUAGES OF AN INTERNATIONAL CONGRESS.

Differences of language have always been a handicap to international scientific congresses. Few ophthalmologists can understand and easily follow more than one or two languages other than their own; and no one wishes to listen to papers and discussions that he does not understand. The most successful gatherings will always be those in which but one language is spoken, the one with which every one present is most familiar. The same is true to a less extent of the reading of the transactions of such a congress. One feels less interest in a volume in which many of the papers are printed in languages read with difficulty, or quite unknown.

On account of this difficulty, it has been customary in the past to select as official languages a few (usually three) most familiar to the mass of members likely to attend such a gathering, and to require that all papers and remarks in discussion before the Congress should be presented in one of the official languages, and so printed in its transactions. This custom has been followed for the Washington International Congress, English, Spanish and French, obviously the languages of the greater part of those who could be expected to attend and take part in the proceedings, being selected.

A larger number of languages would have greatly increased the difficulties of preparing the presession volume and

the abstracts of papers, to be printed in the program in *all* the official languages. On this account it was deemed wise not to include Italian among the official languages, altho it has been so included in two or more preceding international congresses of ophthalmology. Other nations speaking other languages will be represented in the Congress, but from none of them has protest or criticism been offered on that account, except with regard to the German language. According to the editor of the KLINISCHE MONATSBLAETTER FUER AUGENHEILKUNDE, the opening address at the Congress held at Vienna protested because "die deutsche Sprache" was shut out from the Washington Congress. A similar protest came from the ophthalmologic society of Finland, reaching the committee to whom it was addressed after it had been published in the German journal.

There seems very little excuse for honest misapprehension in this matter. In the original announcement regarding the scientific proceedings of the Washington Congress it was clearly stated: "Each speaker in discussion may use such language as he prefers, but the substance of his remarks must be furnished for publication in one of the official languages of the Congress." In reply to every question about this, it has been explained that this applied to the presentation of any paper that might be submitted under the published rules, and accepted for the Congress.

The complaint of Germans and their partisans amounts to this, that German was not made an "official language" of a congress where Germans were not expected to attend, and where under any circumstances very few of them would have attended. To treat the German language as every other language, except those adopted, had been treated, has called forth the cry of "Boycottiren" both at the Vienna and at the Heidelberg Congress, in which gatherings no language but German seems to be used.

Whether Germans should have been invited, when no diplomatic channels existed to carry the invitation; or whether some later or less dignified form of invitation would not have awakened equal resentment; or whether special inducements might not have been offered that would have brought some Germans to the Congress, are questions about which argument is possible; but the complaint of "Boycotting" "die deutsche Sprache" is poorly founded. E. J.

CHANGES.

The new volume will probably contain more pages than its predecessors. To provide for this and the future growth without unduly increasing the bulk of the JOURNAL, a thinner paper of equally good quality has been chosen, and is used in the present issue.

Hereafter the lists of CURRENT LITERATURE will be published monthly in the JOURNAL instead of quarterly in OPHTHALMIC LITERATURE. It seemed well to suspend such monthly publication while the literature was still so mixed by the failure of international communications. But this difficulty has largely been overcome, and it is believed monthly publications will prove more serviceable. Except for this OPHTHALMIC LITERATURE will be published as last year.

BOOK NOTICES.

Atlas of Slit Lamp Microscopy of the Living Eye. Prof. Dr. Alfred Vogt, Director of the Ophthalmic Hospital at the University of Basle. Authorized translation by **Dr. Robert Von Der Heydt,** Chicago. Large octavo, 153 pages, and 38 plates containing 370 figures. Berlin, Julius Springer, 1921.

The phrase "microscopy of the living eye" may properly be applied to all examinations of the anterior segment of the eye with a magnifier, and to all examinations with the opthalmoscope. It has become current in connection with the use of the so-called corneal microscopes. The "slit lamp" is Gullstrand's modification of the Nernst lamp, a powerful and eco-

nomic illuminant, not widely used because it is somewhat costly, and a little time is required to develop the light after the current has been turned on.

The recent advances in the study of the ocular media have been due more to the improved form of illumination, than to increased magnifying power in the microscope lenses. But it is probable that a more convenient and equally efficient source of light will be found to replace the slit lamp. Indeed, in this work "in many instances the substitution of a microarc lamp is suggested." But an essential character of the illuminant is the sharp limitation of the illuminating pencil of light, whatever its source, so that it gives an "optical section" of the tissue.

Four ways of using the light are given. 1. Direct lateral illumination, ordinary "focal illumination." 2. transillumination, the light shining thru the tissue to be examined. 3. Examination of reflecting surfaces in circumscribed intensely illuminated areas. 4. Indirect lateral illumination, in which the margin of the illuminated area is used. Such variations of ordinary focal illumination have all been put to practical service before the advent of the slit lamp; but it remained for this method, in the hands of enthusiastic students like Vogt, to reveal how much of histologic detail there was to be seen in this way.

This book is an atlas, in which these details are reproduced with some explanation of the significance of such representations. Most of the plates are in colors; and instead of the sheet of errata often placed in book to call attention to typographic errors, we have here such a slip pointing out where the reproductions of colors fall short of complete fidelity to the appearances of nature. Some 15 of the figures are thus subjected to correction, but the great majority of these figures need no correction.

The contents of the book are arranged in an introduction, the technic, methods of examination, and examination of the different tissues in this order; cornea, lens, iris and vitreous, and an appendix including the examination of the conjunctiva, eyelids, etc. There is a bibliography of the literature, and an index. The explanation of the figures given occupies four-fifths of the book, constituting a direct and practical guide to the student, who is attempting to understand what can be seen by this new assistant to vision. Some of the notes explaining the figures give detailed reports of the cases on which the observations were made.

Slit lamp microscopy has thus far been applied chiefly in the laboratory or as method of original research; but it will certainly be gradually brought into more general clinical use. Vogt points out that the manipulations of the apparatus are not easily acquired, but its successful application requires as much practice as the use of the ophthalmoscope. The high cost of the apparatus has also prevented the rapid adoption of the method. The ordinary coddington lens used as a magnifier gives an amplification of 10 to 15 diameters. The ordinary range for the corneal microscope is from 10 to 68 diameters, about 24 being most frequently employed. The value of the highest powers, 80 to 108 diameters, is lessened by the oscillations of the eyeball.

No one who wishes to become skilled in this method of examination can afford to work without this atlas. Indeed, one who desires only to become familiar in a general way with the advances of ophthalmic science in this direction will find this work a short, easy path to such knowledge. On all accounts it is a welcome addition to our resources. As might be expected of any English book brought out by a foreign language publisher, it is not free from typographic errors; nor is the translation always smooth and complete. But these faults are less in evidence here, than in some other works that have come to us in this way. E. J.

The Life of Jacob Henle. Victor Robinson, M.D., Octavo, 117 pages, 4 plates. New York, Medical Life Publishing Co. 1921.

Henle (1809-1884) was a laboratory worker in histology, embryology and

physiology. Except as a student he never practiced any branch of medicine; and the state examination, which he took at Berlin, he felt to be a heavy burden, requiring, as it did, a knowledge of symptoms and treatment. Under the influence of Johannes Mueller, he early became interested in anatomy, human and comparative; and his dissertation submitted for the Doctorate in 1832 described for the first time the membrana pupillaris. His continued interest in the eye led to his descriptions of the histology of the retina (1839), the physiology of the lacrimal passages (1865), the fibers of the crystalline lens (1875), the structure of the lens (1878) and its development (1882). The lymph follicles of the palpebral conjunctiva are "Henle's trachoma glands." The limiting membrane of the choroid is the "membrane of Henle" or Bruch. The nerve fiber layer of the macula is "Henle's fibrous layer." Masses at the border of Descemet's membrane are "Henle's warts." He discovered (1852) that the yellow spot of the retina contained only cones.

Henle worked with Schwann in Mueller's laboratory; and in the epoch making joint contribution of Schleiden and Schwann to the foundation of the cell theory, Henle's work on the epithelium is the first citation by Schwann in support of the new claim that the cell is the most important tissue unit. There are good reasons that the picturesque, scientific and social career of Henle should be better known to American physicians, and particularly to ophthalmologists. He taught at Zurich, Heidelberg Goettingen, a source of strength to every faculty with which he was connected.

He was a progressive and liberal, sent to prison for a time for his connection with the radicals of his youth, and saved from the early eclipse of his career by the intervention of men like Humboldt. His social talents that brought him warm friendships, his love for music, his choice of Goettingen rather than Berlin, revealing his clear comprehension of the values of life, are all dwelt upon in this biography in most interesting fashion.

Portraits of Henle, Kussmaul, Waldeyer and Mueller, all great anatomists of the nineteenth century, are here given. The text is admirably written, so that there is not a dull page in the book. Its condensed account of a great scientist and his useful life brings the reader in close contact with the formative stage of modern medicine. The excellence of this first biography of Henle to appear in English will give it a permanent place, in the broadly educational books that every member of our profession can read with profit, interest and recreation. E. J.

A Contribution to Brain Surgery—By **V. Magnus**, Christiania. Paper, 138 pages, 14 charts of visual field, 2 plates, Christiania. Merkur Publishing Co. 1921.

The work is based on a surgical experience of 139 cases. There are many detailed case histories and final results are tabulated as follows:

(a) Diagnosis of brain tumor:—112 cases with 197 operations; cured, 12; marked improvement but with some defect remaining, 7; relieved of pain and with retention of sight during remainder of life, 48; deaths, 16; a mortality of 13.7% and an operation mortality of 8.1%.

(b) Trigeminal neuralgia, 31; cured, 30; no mortality.

(c) Epilepsy, 20 cases; 10 traumatic with 2 cures; 2 improved, 5 unchanged and 1 death. The 10 cases of genuine epilepsy were all unimproved.

(d) Miscellaneous. 7 cases.

Headache, vomiting and papillitis he finds the commonest early symptoms of cerebellar tumor. The headache appears either as frontal or occipital on the same side as the tumor. The earliest cerebellar symptoms are changes in gait, incoordination, and nystagmus to the same side as the tumor. The first focal sign usually appears as a reduced sensation in the parts supplied by the 5th nerve, noticed first in the corneal reflex on the side of the tumor.

There were 13 cases of tumor of the hypophysis. The very earliest visual disturbance in tumor of the hypophysis is a color defect in the upper temporal quadrant, which defect widens into a complete temporal hemiachromatopsia, while the field may yet be unimpaired for white. Then the white, too, fades in the temporal fields. The process affects both eyes, successively or simultaneously, giving a bitemporal hemiopia, which is characteristic of hypophyseal tumors. Atrophy of the optic nerve appears sooner or later. Papillitis is never present except late in the disease, and is then an evidence that the tumor has broken thru the diaphragm of the sella turcica and is occluding the foramen of Monro. Further growth often produces pressure on the 3rd, 4th and 5th nerves, causing paralysis of the eye muscles, and on the cavernous sinus giving exophthalmos. Radical extirpation was done in only one case. The author's treatment by preference is decompression on one or both sides followed by radiation.

Some of the conclusions of the author are:

Decompression should be done as soon as a diagnosis of cerebral tumor is made and a beginning papillitis appears.

In Jacksonian epilepsy and in traumatic epilepsy, an exploratory craniectomy should be done even if no papillitis is present.

A case of persistent injury of the head should be watched with the ophthalmoscope and, if swelling of the disc appears, a decompression should be done.

If the dura appears very tense at the time of operation, a puncture of a lateral ventricle should be done before the dura is opened.

Peripheral operations for trigeminal neuralgia are useless; if alcohol injections fail, either the Gasserian ganglion should be extirpated, or its pontine root torn out, preferably the latter.

The book gives evidence of careful and conscientious work. The author has been at a disadvantage in that he has lacked specialized assistants, that he has often been compelled to work at different places and that all his cases have been private patients.

D. L. TILDERQUIST.

The American Encyclopedia and Dictionary of Ophthalmology, edited by **Col. Casey A. Wood,** M.R.C., U.S.A., M.D., C. M., D.C.L., assisted by a large staff of collaborators. Volume XXVIII. (See also v. 4, p. 938.)

We have now come to the end of the first edition of this stupendous work, which, however, will doubtless be followed by several additional volumes. Of the greatest interest in this recent volume are the three hundred pages on "War, Ophthalmic Medicine and Surgery In," by Lloyd Mills, of Los Angeles, who supplements his original essay on "Military Surgery of the Eye," published in Volume X, with this very complete essay, i.e., the former volume brought the subject up to 1917, and the present section carries it to 1921. A very complete resume is given of the organization of the ophthalmic service, particularly of the American and British armies.

War wounds and infections are further discussed. Gas Bacillus infections; tetanus; metastatic ophthalmitis; exogenous infections; other injuries of the eye, particularly intraocular foreign bodies; practical surgery; the problem of enucleation; sympathetic ophthalmitis—which in this war was exceedingly rare—injuries of the orbits and adnexa; the relations of military injuries of the skull and brain to ocular and visual disorders; psychoneuroses of war, malingering, the effects of asphyxiating, lacrimatory and vesicant gases in warfare; nightblindness, for which a new word, "hesperanopia," has been devised; the visual requirements of soldiers; the welfare of the war blind; the relation of the eyes to aviation, are all extensively entered into, excerpts being made not only from the literature of English speaking countries, but those of the various European nations and of Japan as well.

On the whole, this vast compendium of ophthalmic literature is a necessary part of the oculist's equipment and will be for a decade, for without doubt the managing editor, Colonel Casey A. Wood, had seen that nothing has been omitted and that the work of his many collaborators has been well orientated, and thus the series of eighteen volumes makes a complete whole. It is a monument to the indefatigable ardor, as well as the knowledge, of this master of ophthalmology, as well as to his coworkers, all of whom had otherwise placed themselves in the front ranks of scientific ophthalmology.

H. V. W.

The Practical Medicine Series, Volume III, Series 1921. **The Eye, Ear, Nose and Throat.** Edited by **Casey A. Wood,** C.M., M.D., D.C.L.; **Albert H. Andrews,** M.D.; **George E. Shambaugh,** M.D.

This little annual takes cognizance of only a portion of the leading articles having to do with practical clinical subjects. The editor notes that many essays of interest are yet based on military experiences. In addition, during the past year there have been a large number of papers on the ophthalmic relations of lethargic encephalitis, focal infections, and a number of other conditions, and considerable space has, for the sake of the general practitioner, been devoted to these captions. Aside from these subjects, a number of articles are noted on the hygiene of the eye and comparative ophthalmology, in addition to a general résumé of the ear, nose and throat, those of the interior ear, adenoids, tonsils and speech disturbance are of particular interest.

H. V. W.

Bericht der deutschen ophthalmologischen Gesellschaft, Heidelberg, 1920, Edited by the Secretary, A. Wagenmann. 406 pages, 66 illustrations. 1921, Munich and Wiesbaden, J. F. Bergmann.

This is the account of the forty-second meeting of this organization. Two years have passed since its last preceding meeting, this being the first held since the cessation of hostilities. Like its predecessors, this volume gives chiefly rather brief communications, with abstracts of such discussions as they provoked. A group of a dozen papers deal with points of anatomy and physiology, especially the anatomy of the anterior chamber, the constitution of the aqueous humor, and especially its constitution in glaucoma.

Among the practical papers, that by Brandt, narrating the experiences at Heidelberg with Elliot's trephining for glaucoma, awakened the most general discussion, 20 speakers. Corneal herpes has furnished a subject for investigation on the part of Grueter and Loewenstein. E. Fuchs gives a note on senile changes in the optic nerve, and Igersheimer on the value of tuberculin therapy. Pfluegk gives a historical sketch on glasses mounted in scissors fashion. Altogether, there are 43 such scientific papers, of which less than half seem to have given rise to any discussion.

An important part of the volume is the account of the demonstrations, given at a special session by 21 of the members. These include pathologic and other specimens, instruments, apparatus, tests and graphic representations of results obtained in various investigations. There are also minutes of the meeting, speeches of various presiding officers, which contain allusions to "German Science" and "German Ophthalmology," and a list of members from which we gather that 135 attended this meeting.

This list contains the names of several Americans who have been dead for various periods; as Hasket Derby 7 years, George Strawbridge 7 years, C. F. Wadsworth 10 years, and Charles J. Kipp 11 years. Among the English names we note those of Nettleship, who died in 1913, and Angus McNab, whose tragic death in 1914, while trying to give relief to the wounded, is one of those incidents of war that are not easily forgotten by those who appreciated his work and his promise.

E. J.

CORRESPONDENCE.

Title Page Dates Versus Copyright Dates.

To the Editor: Under our laws he who first sends to the Librarian of Congress two printed or typewritten copies of the title page of a proposed publication, accompanied by the legal fee, is given a copyright—no matter whether he be or be not the author of the proposed publication. It is left to the courts to decide, in cases of alleged fraud, who is the real owner. It is a case of the one being served first who comes first. Perhaps this is the appropriate as it is the expeditious way of handling a vast amount of business.

The aggrieved party has a show for justice. But what is the status of an author who, having permitted his publisher to obtain the copyright, finds that the child of his (the author's) brain has been placed in the class of illegitimates?

Suppose, for example, that a well-known book on ophthalmology was last printed in the year 1916; suppose that five years later, a sharp publisher, having on hands a few copies, and desiring to sell them quickly, should bind the printed sheets and should place in the volume a title page dated 1921. What recourse does the author have?

The glib salesman can tell the prospective buyer that "this is the last edition." Of course it is, for the author has not yet forwarded the manuscript for the new one.

What recourse has the author? None! His best friends may revile him, for they are ignorant of the facts. They may write him letters so full of sulphur and phosphorus that the recipient wonders that they do not burn the mail bags. What can the poor devil do? Only this: try to smile (*risus sardonicus*)—and he can do one thing more:

He can tell the members of his profession never to buy a book on the strength of the date printed on the title page, for it is only the copyright date that counts. That is the legal and actual date of the year of publication.

It is a pity that authors should be humiliated by the practices of unscrupulous publishers. And it is deeply to be regretted that publishers who obtain money by false pretenses are not inhabiting that sphere of limited bounds, where "big ones are broken into little ones."

James Moores Ball.

St. Louis, Mo.

PROF. FUCHS IN ST. LOUIS.

To the Editor: The Ophthalmic Section of the St. Louis Medical Society announces a course of lectures in Ophthalmology, to be given in St. Louis by Professor Ernst Fuchs of Vienna during the month of February, 1922.

Further information regarding this course may be obtained by writing to the Fuchs Lecture Committee, St. Louis Medical Society, 3525 Pine St., St. Louis, Mo.

E. J. Goodwin.

ABSTRACTS

Hagen, S. Serous Postoperative Detachment of Choroid. Klin. M. f. Augenh. v. 66, 1921, p. 161.

Hagen made, during 9 months, a systematic investigation in the eye clinic of Prof. Schiötz on the serous postoperative detachment of the choroid. Besides the ophthalmoscope, he found the transillumination the most useful for diagnosis, where the former failed. If around the illuminating point the sclera shows light, it signifies that the choroid is detached from it by serous fluid. He found the detachment most frequent after Elliot's operation, in 41 cases, i.e., 76%, after cataract extraction in 13 cases, 22%, and concludes thus: The escape of aqueous from the opening of the anterior chamber is for the most part replaced from the vitreous. If this continues, as after Elliot's operation or fistula of the cornea, the vitreous must finally lose considerably in volume, so that the pressure on the choroid is diminished and a traction exerted on it, leading to detachment. The gap is rapidly filled with transudation from the engorged large choroidal vessels. It occurs only in older persons with rigid sclera. The youngest patient was 34 years. After closure of the fistula, the choroid was reattached. It lasts scarcely 3 weeks and gives a good prognosis, seldom requiring treatment. Puncture of the sclera is not rational. The pigment streaks that sometimes remain are probably caused by a proliferation from the pigment epithelium at the folds of the angle of the detached portion.

C. Z.

Fleischer, B., and Ensinger, T. Homonymous Hemianopsia After Gunshot Injury of the Skull, Especially the Occiput. Klin. M. f. Augenh., v. 65, 1920, p. 181.

The authors report on 67 cases under the following headings: (I) Unilateral and chiefly unilateral hemianopsia; (a) right sided hemianopsia; 1. Merely right sided hemianopsia. 2. Chiefly right sided hemianopsia with participation of the left half of the visual field. 3. Right sided quadrant hemianopsias. (b) Left sided hemianopsias with the corresponding subdivisions.

(II) Bilateral hemianopsias; (a) inferior hemianopsias; 1. Pure inferior hemianopsia. 2. Chiefly inferior hemianopsia with participation of the upper field; (b) superior hemianopsias.

(III) Hemianopic scotomas; (a) Central Scotomas; (b) Paracentral scotomas extending to the point of fixation; (c) Scotomas outside of the macular region. All are illustrated by charts of the visual fields.

With regard to principal questions, the intactness of the macula was found 27 times, its participation 5 times. These phenomena are differently explained by different authors. Case twenty-seven, with injury of the posterior pole of the brain and intactness of the macula, spoke for the theory of Levy of the double supply of the macula. Case ten made this explanation superfluous because a later examination disclosed an improvement in the form of a peripherally progressing recovery of the macular region. The starting point for a peripherally progressing regeneration must certainly be sought in an intact macular region of the same side. Otherwise the assumption of double supply is rendered improbable by the occurrence of central hemianopic scotomas and of the circumscribed scotomas of the macular region extending into the point of fixation. The disappearance of the macular quadrant after operative removal of the projectile is not compatible with a double supply, as here the adjoining macular center towards the pole or the corresponding fibres were damaged by the extraction.

An encroaching of the defect upon the intact visual field in the macular region occurred in cases 15 and 16. In both, according to the seat of the injury, a destruction of both macular centers is easily intelligible.

C. Z.

Pick. Blindness of New Born Child from Instillation of Wrong Drops. Klin. M. f. Augenh., v. 66, 1921, p. 485.

A midwife instilled into the eyes of a newborn child some drops of supposed 1% solution of nitrate of silver. Immediately the child screamed from intense pain for 2 hours, when the parents noticed at the place of the eyes glassy gelatinous formations in the orbits, which were the excessive, enlarged, thinned cornea. Both eyes were destroyed. As the same drops had caused intense irritations in two previous cases, the solution was sent to a druggist who stated that it was labeled 10% nitrate. Then it was thrown away and no further examination was possible. Pick made experiments on young rabbits with a 10% solution of nitrat of silver, 10% sodium hydrat, and carbolic acid. The eyes treated with 10% sodium hydrat and carbolic acid were lost within a week from phthisis after perforation of the cornea. The 10% nitrate of silver caused an intense diffuse opacity of the cornea, but the anterior chamber and deeper parts remained intact. C. Z.

Kummell, R. Injury of Cornea by Roentgen Rays. Klin. M. f. Augenh., v. 66, 1921, p. 480.

Kummell observed after Roentgen radiation diminished sensibility of the cornea, in one case to such an extent that the cornea could be indented without eliciting defensive movements, also of the other branches of the fifth nerve. Twice the intraocular pressure was transiently increased.

Kummell then relates the further facts of the child, aged 3½ years, with glioma of the retina, reported in 1918 at Heidelberg. Roentgen rays had undoubtedly very much influenced the glioma, as shown by the recession and reattachment of the retina and recurrence of a slight pupillary reaction to light. But new nodules occurred, which healed with radiation, leaving only one at the last examination. The child, however, died after a month from pneumonia. An autopsy was not granted. C. Z.

Sunseri. Proteolytic Ferments in Ocular Diseases Investigated by the Abderhalden Method. Arch. di Farmac. Sperimentale, v. XXX, Oct. 15, 1920, p. 127.

The therapeutic basis of the Abderhalden method may be summed up in the author's words. "Each organism which is the seat of a pathological process undergoes a disintegration of its own specific tissue, this protein thrown into the blood stream causes the appearance in the blood of a ferment destined to break it down." Sunseri reviews the literature of the reaction as it has been applied to ophthalmology, especially in the case of cataracts. Von Hippel, Frenkel and Nicolas have found that the blood serum in cases of cataract shows no proteolytic substances for lens protein. Von Hippel and Hegner both obtained a fair number of positive results in sympathetic ophthalmia. Frenkel, Nicolas and Ficher obtained only negative results with uveal proteins in cases of irido-cyclitis. The author emphasizes the need of observing an exact technique in order to obtain dependable results and describes in detail his technique for preparing the "sub-strate" or proteid which is to be digested and of testing the serum of patients for the ferments which will digest it. The author's results are as follows:

Lens—The serum of four patients with traumatic cataracts out of five cases tested showed a ferment specific for lens protein. Of 32 cataracts of other varieties, mature and immature, only eleven showed this specific ferment. Three of these which had been positive became negative some weeks after cataract operation, which is fairly strong evidence that a specific antibody had been present. Of eleven normal sera, only two were weakly positive. These positives in normal sera may be explained as the development of a ferment, not for lens protein but for an identical protein derived from tissues elsewhere in the body. Traumatic cataracts were produced in fourteen rabbits and eleven of these rabbits gave positive reactions in their serum. Six of these were reexamined after the cataractous eye had been removed and five gave negative results on the third day after the

operation. Four normal rabbits gave negative reactions. Reactions to choroidal protein were negative in two trials so the reaction was evidently specific for lens protein. The aqueous removed from three of these rabbits with traumatic cataracts showed no specific ferment, but probably the amounts present in aqueous are too small to be detected. The author suggests the interesting possibility of injecting these cataractous animals with increasing doses of lens substance in order to observe whether any increase in the ferments occurs and whether any effect is produced on the absorption of the cataract.

Cornea—Using macerated cornea as sub-strate, the serum of twenty cases of various kinds of keratitis were tested and only five gave positive reactions. Two were interstitial keratitis, one was a healed ulcer, one recurrent keratitis and one hypopion ulcer. This agrees with Bernaud's results which showed a fair number of positives in interstitial keratitis and a very small number in other diseases of the cornea. Keratitis was artificially produced in five rabbits and serum in four of these gave positive reactions, two becoming negative after enucleation.

Uveal Tract—Of nine cases of choroiditis, four gave positive reactions to choroidal protein. Three of these were ruptures of the choroid and one was luetic choroiditis. Two cases of suppurative iritis were positive while other forms of iritis were negative. No results were obtained which would have any bearing on the origin of glaucoma. Of seven cases of sympathetic ophthalmia, one was positive and the other was negative. Negative results to retinal protein were obtained in retinitis pigmentosa, albuminuric retinitis, and luetic retinitis. The most interesting result was obtained in two cases of tumor. A case with a conjunctival epithelioma showed a positive reaction to conjunctival protein and one with a choroidal tumor was positive for the choroid.

The author concludes that the method does not lend itself to practical diagnosis or prognosis. In traumatic processes of any part, a positive reaction is nearly always present. In non-traumatic processes, it is nearly always present because of the small amount of metabolic products drawn into the circulation. . It has no prognostic value in traumatic cases. It is usually negative in luetic processes. Reactions in cases of tumor seem to offer favorable results and further work is desirable on this subject.

S. R. G.

Fuchs, A. Pathogenesis and Anatomy of Cysts of the Retina. (With 19 figures in the text.) Graefe's Arch. fuer Ophthal. 105, p. 333.

The author does not consider cysts of the retina clinically important, as ophthalmoscopic proof is almost impossible on account of technical difficulties. They appear generally in eyes which, either in the course of a severe inflammation or subsequent detachment of the retina, become blind and which succumb to secondary intraocular pressure.

He examined 99 eyeballs with cysts of the retina. In 55 cases there existed a detachment of the retina without glaucoma; in 15 cases retinal detachment was associated with glaucoma. In 20 cases, which were enucleated for secondary glaucoma, the retinas were in apposition.

Fuchs does not consider the "cysts" as true ones, in a pathologicanatomic sense; as these cavities within the retina are not lined with epithelium. They are small cavities within the tissues of the retina thru enlargement of small folds filled with fluid, either rich or poor in albumin, the walls of which consist of retinal tissue, which is at times more or less dense. He designates these pseudocysts, cavities which originate thru gluing together of retinal folds.

In the majority of cases we can prove the mechanical origin of the cyst formation. In the following, he divides the cysts into groups according to their mechanical formation. As many cases show a manifold mechanical origin, it becomes difficult to put them in a group.

I. Cyst formation on the outer side

of the retina with detachment and retinochoroidal synechiae.

II. Cyst formation on the inner side of the retina, produced by pulling or stretching bands.

III. Thru shrinking of the retina.

IV. Cysts with secondary glaucoma and the retina in apposition with the choroid.

V. Cysts occurring with tumors of the choroid.

He concludes, that even if all these formations have no special clinical signification, the study of their origin is worth while, because the influence of the mechanical power on the pathologic processes of the retina are shown.

H. A.

Gabrielides, A. Etiology of Vernal Conjunctivitis. Ann. d'Ocul. 1920, v. 157, p. 282.

The author refers to previous articles, in which he laid stress on the presence of eosinophiles in the conjunctival secretion, the tarsal granulations, and the peripheral blood, and the occurence of the disease in several members of a family. Since then, bacteriologic study has revealed nothing of importance. Study of the blood of 18 patients, however, has shown 7.72% eosinophiles in the peripheral circulation and 7.05% in the blood taken locally, from the vegetations. The presence of these cells is a defense reaction of the body against certain bacteria, parasites, worms or organic cells.

The familiar quality of the disease is shown by its presence in at least two members of each of the 13 families, whose histories are given. Certain facts have been observed—no husband ever infected his wife or vice versa; no servant, nurse or visitor was ever infected. Only children, as a rule were affected, but no child infected its parent, and when the parent was previously affected, the child usually resembled in physical characteristics the affected parent. From the above considerations, the author concluded that the disease was not a microbic affection. Experiments on an ape and two children showed that direct inoculation was impossible. Microbes, parasites and worms were excluded by careful examination of the secretions and excretions of the patients.

Investigation by others has shown that the rays of the sun are a secondary rather than a primary cause of the disease. The author believes that an atmospheric change, probably electrical, rather than the sun's rays, is the cause, in persons predisposed to the disease thru an autointoxication.

C. L.

Kleefeld, G. Sulfarsenol in Ophthalmology. Ann. d'Ocul. v. 157, 1920, p. 428.

This drug is a methylsulphur derivative of salvarsan, in the form of a yellowish powder. The advantages claimed for it are that it is very soluble and the solutions are practically unaffected in the air. Its toxicity is one-half, and its potency is twice that of neosalvarsan. It can be used for intramuscular injections; and if the fluid spreads around the vein, it produces neither induration nor sloughing. Intramuscular injection is slightly painful, but there are never untoward symptoms. The Bordet-Wassermann test frequently becomes negative in a very short time in primary syphilis.

The author treated a dozen cases of specific iritis, some with condylomata, with intravenous injections every two days. The first injection was always followed by an amelioration. In 15 days the condylomata had disappeared. The retrogression of the lesions were watched by the corneal microscope and Gullstrand's illumination. A case of specific neuritis was not affected by the treatment. Parenchymatous keratitis varied in its response to the drug. Chronic syphilis was very little affected by the treatment, but infantile syphilis responded very readily. Scrofulous ophthalmia also was very favorably influenced.

C. L.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orelans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Hononlulu; Dr. E. B. Cayce, Nashville, Tenn. Volunteers are needed in other localities.

DEATHS

Dr. A. Casali, Professor of Ophthalmology at the University of Florence, died recently.

Dr. Henry C. Shutte, West Plains, Missouri, died October twelfth, in Chicago, from a carcinoma of the throat, aged sixty-three.

Dr. Frances P. Sprague, of Boston, died at the age of eighty-eight. He was a veteran of the Civil War, formerly a surgeon at the Massachusetts Charitable Eye and Ear Infirmary, and a member of the American Ophthalmological Society.

PERSONALS

Dr. P. J. H. Farrell has been elected Commander of the Chicago Chapter of Military Order of the World War.

Dr. Alexander Duane, of New York City, has been chosen Chairman of the Graduate Council of Union University.

Dr. S. Lewis Ziegler gave a dinner at his suburban home at Haverford, October 17th, in honor of Professor Van der Hoeve of Holland.

Dr. L. Webster Fox, of Philadelphia, gave a dinner to Professor Fuchs, on Wednesday evening, October nineteenth.

At the October meeting of the Philadelphia Medical Club, Dr. Paul Sartain was nominated for Second Vice-President.

Dr. Julio Senior, an ophthalmologist of San Domingo, has returned to his home after spending some time in the United States.

Dr. Homer E. Smith, of New York, has resigned from the board of medical governors and as visiting ophthalmologist to the New York Diagnostic Clinics.

Dr. Ring, of Philadelphia, spent the early part of September as the guest of the Anglo-American Fish and Game Club of Canada. The month of September is said to mark the best trout fishing in those waters.

Dr. Theodore Dimitry, Professor of Ophthalmology at Loyola University, and Chief Visiting Ophthalmologist to Charity Hospital of New Orleans, has been elected President of the Visiting Staff of Surgeons and Physicians to this hospital.

A number of well known ophthalmic surgeons of Philadelphia, reached home during September and October, having spent their summer and early fall in Europe. Among them were, Dr. Howard Forde Hansell, Dr. S. Lewis Ziegler, Dr. Wm. M. Sweet and Dr. Burton Chance.

Dr. Melville Black of Denver has been made Professor of Ophthalmology and head of the department in the University of Colorado Medical School, as successor to Dr. Edward Jackson, who has been made Professor of Ophthalmology, Emeritus.

A letter from Dr. John O. McReynolds, of Dallas, tells us that thru his personal solicitation Dr. Barraquer, of Barcelona, and Col. Elliot, of London, have promised to accompany him on a tour of some of the larger cities of this country, just preceding the meeting of the International Congress in Washington.

Dr. Luther Peter of Philadelphia, Chairman of the Eye, Ear, Nose and Throat Section of the Medical Society of the State of Pennsylvania, gave a dinner at the Union League, on Wednesday, October fifth, to Professor Van der Hoeve, who was his guest during his stay in Philadelphia. Professor Van der Hoeve visited America in response to an official invitation of the American Academy of Ophthalmology and Oto-Laryngology.

Dr. George E. de Schweinitz, of Philadelphia, returned early in November from China, where he represented the University of Pennsylvania at the ceremonies attached to the installation of the Director of the Peking Union Medical College. He went also as one of a committee of the Rockefeller Foundation of Medical Research; and delivered one of the formal addresses at the installation ceremonies. At a reception given by University of Pennsylvania graduates to General Wood, Provost of the University, absent on leave for one year, Drs. de Schweinitz, Dr. Harvey J. Howard, and Dr. T. M. Li (1908) took an active part.

COMING MEETINGS

International Congress of Ophthalmology, Washington, D. C., April 25-28.

American Ophthalmological Society, Washington, D. C., May 1-3.

Section on Ophthalmology, American Medical Association, St. Louis, May 22-26.

Oxford Ophthalmological Congress, Keble College, Oxford, England, July 5, 6, 7, 8.

American Academy of Ophthalmology and Oto-Laryngology, Minneapolis, September 19-21.

SOCIETIES

The 1922 meeting of the American Academy of Ophthalmology and Oto-Laryngology will be held in the Twin Cities of St. Paul and Minneapolis, Minnesota, September 19-21 inclusive. This will be followed by a three days' course section on instruction, September 22-24 inclusive, 1922. Preceding the regular meeting will be held the examinations in Ophthalmology and Oto-Laryngology by the Examining Board. Dr. Horace Newhart is Chairman of the Local Committee.

The recent annual meeting of the American Academy of Ophthalmology and Oto-Laryngology, which was held in the Bellevue Stratford Hotel in Philadelphia, was considered the most successful in its history. The attendance was very large and enthusiastic.

At the December meeting of the Ophthalmic Section of the College of Physicians of Philadelphia, Dr. Edward Martin, Commissioner of Health of Pennsylvania, discussed the subject: "Does the status of Ophthalmia Neonatorum in Pennsylvania point to the need of Prophylactic Legislation?" Dr. Martin has investigated the subject with discriminating care, and his pronouncement will be looked upon with great interest.

At the December 15th meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, papers were read by Dr. S. Lewis Ziegler on "Complete V-Shaped Incision for Pyramidal and Zonular Cataracts;" by Dr. T. B. Holloway, Clinical Cases, "Plastic Operation of Lid," "Cicatricial Entropion," and "Amaurotic Family Idiocy"; Dr. G. Oram Ring, "Pulsating Exophthalmos, Ligation of Carotid"; Dr. H. M. Langdon, "Keratitis Profunda Treated by Radiant Heat from Thermophore of Shahan"; Dr. Edward Martin, "Shall Pennsylvania Make Compulsory the Application of Silver Nitrate to the Eyes of Newly Born?"; and Dr. G. E. de Schweinitz, "Types of Toxic Amblyopia with Illustrative Cases."

The October meeting of the Ophthalmic Section of the College of Physicians of Philadelphia, was marked by the presence of Professor E. Fuchs of Vienna, and Professor J. Van der Hoeve of Leiden, Holland. The former gave a lantern demonstration upon "Senile Changes in the Optic Nerve," and the latter, a lantern demonstration upon "The Development of the Lacrimal Canal in Normal and Abnormal Conditions." A cordial appreciation of the distinguished guests was given by Dr. G. Oram Ring, Chairman of the Section.

The discussion upon Professor Fuchs' demonstration was opened by Dr. Edward Jackson of Denver, Colorado; and that upon Professor Van der Hoeve's demonstration by Professor J. Parsons Schaeffer of Jefferson Medical College.

Previous to the Section Meeting, a dinner of thirty covers was given the foreign guests by Dr. Ring, at the Union League.

MISCELLANEOUS

A new Eye, Ear, Nose and Throat Hospital will be erected in New Orleans at a cost of approximately $350,000.

The Manhattan Eye and Ear Hospital was recently bequeathed $10,000 by the will of Mrs. Jemina S. Simms.

The Chapin Memorial Home for the Blind, Philadelphia, was left $10,000 under the will of Emily Dutiln.

The Minneapolis Civic and Commercial Association has been making a study of street lighting, and has recently made a report with recommendations for installing an efficient, economical and artistic lighting system in Minneapolis.

Connecticut has passed a law making it compulsory to report within six hours the presence of disease in the eyes of the newborn baby. The state furnishes a prophylactic for use in the newborn for physicians and midwives.

Mrs. Duncombe of London, founder of the Guild of Blind Gardeners, who is herself blind, says she can tell different flowers by the sense of touch. Blind gardeners have been known who could tell the different types of roses by touch alone, where to other blind people scent was the chief guide.

The first examination of the National Board of Medical Examiners, Parts I and II, under the new plan, will be held as follows:

Part I, February 15, 16 and 17 (1922) inclusive.

Part II, February 20 and 21 (1922) inclusive.

Applications for examination should be received not later than January 15, 1922. Application blanks and circulars of information may be had by writing to the Secretary, Dr. J. S. Rodman, 1310 Medical Arts Building, Philadelphia, Pa.

September, 1922, an ophthalmologic course will be held at the No. I. Royal Hungarian University Eye Clinic. Besides lectures and demonstrations, by the representatives of ophthalmologic therapeutics, kindred subjects will be presented by University Professors of Anatomy, Physiology, Internal Medicine, Surgery, Dermatology, Laryngology, etc.

A detailed program will be issued early in 1922. Particulars will be furnished by the Director No. I. Royal Hungarian University Eye Clinic, Budapest, VIII. Mária-utca 39. Emile de Grósz, Professor.

The Hoover Committee for the Elimination of Waste in Industry finds that more than fifty per cent of the men and women employed in American industry are suffering from defective vision. The report was prepared by Herbert Hoover, Secretary of Commerce, and seventeen engineers who worked with him, and is being issued by the Federated American Engineering societies, under whose auspices the gigantic survey was undertaken. L. W. Wallace, Vice-Chairman of the Committee, in an advanced synopsis, estimates that twenty-five million workers have defective vision requiring correction.

The New York State School for the Blind, at Batavia, has made its annual report for the past fiscal year. Dr. F. Park Lewis is President of the Board. The number of inmates totaled 181, of whom 102 were boys and 79 girls. The causes of blindness were as follows: Ophthalmia neonatorum, 36; optic atrophy, 37; congenital cataract, 26; congenital amblyopia, 14; hydrophthalmus, 6; leucoma, 8; cataracts, 7; traumatism, 6; sympathetic ophthalmia, 4; corneal opacities, 7; choroiditis, 3; interstitial keratitis, 3; detached retina, 2; microphthalmus, 2; neuroretinitis, 2; phlyctenular keratitis, 1; myopia and choroiditis, 1; panophthalmitis, 1; choroiditis and microphthalmus, 1; retinitis pigmentosa, 1; congenital malformation, 1; congenital lack of development, 1; glaucoma, 1; microphthalmus-hydrophthalmus, 1; keratitis, 1; iritis, 1; choroiditis with optic atrophy, 1; uveitis, 1; phthisis bulbi, 1; nebula of cornea, 1; iridocyclitis, 1; not diagnosed, 2. During the past year 33 new pupils were admitted. Their causes of blindness were as follows: Optic atrophy, 10; corneal opacities, 7; secondary cataract, 2; congenital cataract, 2; neuroretinitis, 2; panophthalmitis, 1; congenital lack of development, 1; phthisis bulbi, 1; congenital amblyopia, 1; retinal degeneration, 1; retinochoroiditis and corneal opacities, 1; choroiditis and optic atrophy, 1; congenital cataract and progressive myopia, 1; congenital dislocated lens and optic atrophy, 1; traumatism and sympathetic ophthalmia, 1.

It is to be noted that ophthalmia neonatorium does not enter into the causation for the pupils admitted this year; but that it does stand as the cause in twenty per cent of the total number of inmates.

The Kansas City Eye, Ear, Nose and Throat Society held its regular monthly clinic meeting at St. Margaret's Hospital, Kansas City, Kansas, and Bell Memorial Hospital, Rosedale, Kansas, with about 50 in attendance.

Dr. H. W. Woodruff of Joliet, by invitation, operated upon twelve cases, four cataracts, four muscle cases (on two of which he did his tendon tucking operation with his new tendon tucker), one Elliot for glaucoma, one Haitz for entropion, one tear sac extirpation and one iridectomy for total occlusion of pupil. At noon time St. Margaret's Hospital tendered the visitors a buffet luncheon. At the Bell Memorial Hospital, Dr. Sam Roberts of Kansas City gave an ear, nose and throat clinic.

In the evening a dinner was held at the Muehlebach Hotel. Dr. Woodruff gave a moving picture demonstration of his operation for paralytic squint, also tucking operation for squint. The subject was discussed by Dr. R. J. Tivnen of Chicago. A report of the cataract cases operated by Colonel Smith on his June visit in Kansas City was made by Dr. J. W. McKee.

The Society is made up of ophthalmologists and oto-larngologists from Missouri, Kansas, Oklahoma and Arkansas.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given ni English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

PHYSIOLOGIC OPTICS.

Adam, C. Apparatus for examining stereoscopic pictures. Heidelberg Ophth. Congress, 1920, p. 343.

Coblentz, W. W. Characteristics of radiation from quartz mercury lamps. Amer. Jour. Electrotherap. and Radiol., v. 39, 1921, pp. 395-408.

Kroencke, K. Phenomena of visual space. Zeit. f. Psychol. u. Phys. d. Sinnes., v. 52, 1921, pp. 217-228.

Seidel, E. Physiologic secretion of intraocular fluids. Ber. d. deut. ophth. Gesell., v. 42, 1920, pp. 50-55.

Tschermak, A. Exact subjectivism in new physiology of senses. Pflüger's Arch. f. d. g. Phys., v. 188, 1921, pp. 1-20.

Weiss, E. How do loupes and glasses magnify for eye. Deut. opt. Woch., v. 7, 1921, pp. 143-145.

DIAGNOSIS.

Berger, E. New model of stereoscopic loupe. Zent-Zeit. f. Opt. u. Mech., v. 42, 1921, pp. 325-327.

Byers, W. G. M. Eye as signal of disease. Canadian Med. Assn. Jour., v. 11, 1921, pp. 811-813.

Dameno, E., and Barassi, A. Ophthalmoscopy in green light. (2 ill.) La Prensa Med. Argentina, v. 8, 1921, p. 158.

Eicken, v. New binocular loupe for endoscopy. Heidelberg Ophth. Congress, 1920, p. 329.

Ferre, C. E., and Rand, G. Illuminated perimeter with campimeter features. (Dis.) A. J. O., v. 4, 1921, p. 924.

Greene, A. Mercantile marine vision tests. Brit. Jour. Ophth., v. 5, 1921, p. 572.

Groethuysen. Relation of motor and visual differential sensibility in disease of visual organs. Heidelberg Ophth. Congress, 1920, pp. 255-257.

Hegner, C. A. Reading card for sight testing. Heidelberg Ophth. Congress, 1920, pp. 340-342.

Jones, L. W. Method of measuring nyctopsis with results. Brit. Jour. Psych., Gen. Sec., v. 11, 1921, pp. 299-319.

Koeppe, L. Use of "bitumi" with slit lamp illumination. (4 ill.) Heidelberg Ophth. Congress, 1920, pp. 322-329.

Loehlein, W. Psychic factor in testing vision of small children. (2 ill.) Heidelberg Ophth. Congress, 1920, pp. 345-352.

Distance in estimation of visual acuity. (Dis.) Heidelberg Ophth. Congress, 1920, pp. 258-261.

Passow, A. Rheostat for use with ophthalmoscope. Heidelberg Ophth. Congress, 1920, pp. 343-344.

THERAPEUTICS.

Butyn. J. A. M. A., v. 77, 1921, p. 1891.

Franke, E. Injury to visual organs thru eukupin. (Dis.) Heidelberg Ophth. Congress, 1920, pp. 177-180.

Goldschmidt, M. Experimental contribution to optochin therapy. Heidelberg Ophth. Congress, 1920, pp. 173-177.

Haan, L. B. de. Protein therapy in Ophthalmology. Nederl. Tijdschr. v. Geneesk., 1921, il, p. 1421. Abst. J. A. M. A., v. 77, 1921, p. 1934.

Passow, A. Dosage and technic of radiations with Bach's quartz lamp in relation to injury and therapeutics. (1 ill. Dis.) Heidelberg Ophth. Congress, 1920, p. 307.

Seefelder, R. Radiotherapy of human eye. Heidelberg Ophth. Cong., 1920, p. 307.

OPERATIONS.

Brana, J. Lid retractor; trachoma knife. Orvosi Hetil., v. 65, 1921, p. 276.

Repeated Titles. **Kubik, J.** (O. L., v. 17, 1921, p. 944). A. J. O., v. 4, 1921, p. 944.

REFRACTION AND ACCOMMODATION.

Dameno, E. Prisms and decentration of lenses. Prensa Med. Argentina, v. 8, 1921, p. 125.

Diagnosis, diseases and therapeutics of ametropia. Amer. Med., v. 16, 1921, pp. 597-605.

Hoor, K. v. Dangers of hyperopia and myopia. Orvosi Hetil., v. 64, 1920, pp. 13-16.

Olsho, S. L. Multifocal lenses. A. J. O., v. 4, 1921, p. 923.

Paparçone, E. Monocular diplopia and traumatic myopia. Gior. di Med. Ferrov, v. 1, No. 5, 1921, pp. 212-219.

Thomasson, W. J. Causes and treatment of headache. Kentucky Med. Jour., v. 19, 1921, p. 829.

Weiss, E. Spectacle glasses for presbyopes and amblyopes. (3 ill.) Heidelberg Ophth. Congress, 1920, pp. 282-287.

OCULAR MOVEMENTS.

Duverger, C., and Barré, J. A. Associated movements of eyes in tabes, Parkinson's disease, epidemic encephalitis and labyrinthin disease. Rev. Neur., v. 28, 1921, pp. 439-454.

Koellner. Localization of direction and its significance in habits of one eyed. Heidelberg Ophth. Congress, 1920, pp. 142-145.

Lafon, C. Nystagmus and nystagmoid movements. Jour. de Méd. de Bordeaux, v. 92, 1921, pp. 374-376.

Lopes, L. F. Toxic meningitis with ophthalmoplegia. Brazil Med., v. 35, p. 231.

Parsons, J. H. Fourth cranial nerve. (8 ill. Bibl.) Brit. Jour. Ophth., v. 5, 1921, pp. 529-543.

Pollack, W. B. Early operation in convergence strabismus. Brit. Med. Jour., Nov. 5, 1921, p. 733.

Seelye, W. K. Management of squint in children. Northwest Med., v. 20, 1921, pp. 332-335.

Ziegler, S. L. Capsulomuscular advancement without incision. (Dis.) A. J. O., v. 4, 1921, p. 921.

Repeated Titles. **Lafon.** (O. L., v. 17, 1921, p. 110.) A. J. O., v. 4, 1921, p. 942.

THE CONJUNCTIVA.

Blaskovics, L. v. Teal's conjunctival plastic operation. Orvosi Hetil., v. 65, 1921, p. 275.

Buerger, M. Conjunctival edema. Ergeb. der inn. Med. u. Kinderheil., v. 18, 1920, pp. 189-238.

Coppez, H. "Frothy" conjunctivitis. Bruxelles Méd., June 15, 1921.

Cumston, C. G. Antiquity of trachoma. Brit. Jour. Ophth., v. 5, 1921, p. 559.

Ferrell, J. R. Follicular conjunctivitis or trachoma? A. J. O., v. 4, 1921, p. 918.

Gaston, I. C. Trachoma. Northwest Med., v. 20, 1921, pp. 335-338.

Ito, S. Bacillus pyocyaneus infection of conjunctiva and cornea. Japan Med. World, Sept., 1921, p. 21.

Kartal, A. Methods and results of conservative treatment of trachoma. Orvosi Hetil., v. 65, 1921, p. 275.

Kiehle, F. A. Phlegmon of conjunctiva following pterygium operation. (1 col. pl.) A. J. O., v. 4, 1921, pp. 881-883.

Kleinschmidt, H. Is there phlyctenulosis without tubercular infection? Beitr. z. Klin. d. Tuberkul., v. 48, 1921, pp. 188-194.

Noguchi, C., and Kyozo, M. Forms of cells occurring in secretions of eyes. Seii-Kwai Zasshi, May, 1921.

Pattee, J. J. Phlyctenular conjunctivitis. (Dis.) A. J. O., v. 4, 1921, p. 929.

Uhthoff, W. Tarsal conjunctiva with calcareous deposit after vernal conjunctivitis. Heidelberg Ophth. Congress, 1920, p. 309.

Repeated Titles. **Lindner, K.** (O. L., v. 17, 1921, p. 410.) A. J. O., v. 4, 1921, p. 943.

THE CORNEA AND SCLERA.

Axenfeld, T. Posterior embryotoxon of cornea. Heidelberg Ophth. Congress, 1920, pp. 301-302.

Blegvad, O., and Haxthausen, H. Blue sclerotics with fragile bones. Hospitalstid., v. 64, 1921, pp. 609-645. Abst. J. A. M. A., v. 77, 1921, p. 1934.

Brazeau, G. N. Circumscribed ectasia of cornea. Wisconsin Med. Jour., v. 20, 1921, p. 296.

Clausen. Keratoconus and its treatment. Heidelberg Ophth. Congress, 1920, pp. 288-294.

Colombo, G. L. Bilateral changes in cornea following exposure to cold in airman. (Bibl.) Brit. Jour. Ophth., v. 5, 1921, pp. 553-558.

Elschnig, A. Keratoplasty. Heidelberg Ophth. Congress, 1920, pp. 331-332.

Gradle, H. S. Present status of keratoplasty. (4 ill. Bibl.) A. J. O., v. 4, 1921, pp. 895-899.

Grueter, W. Experimental and clinical studies of corneal herpes. Heidelberg Ophth. Congress, 1920, pp. 162-167.

Lindgren, E. Treatment of cornea with lunar caustic in scrofulous keratoconjunctivitis. Hospitalstid., v. 63, 1920, pp. 33-36.

Loewenstein, A. Newer results of studies of herpes. (Dis.) Heidelberg Ophth. Congress, 1920, pp. 107-171.

Macrae, A. Nodular keratitis of South Arabia. Brit. Med. Jour., Nov. 5, 1921, p. 739.

Meisner. Congenital clouding of cornea. (2 ill.) Heidelberg Ophth. Congress, 1920, pp. 334-336.

Paterson, J. V. Treatment of corneal ulcers. Brit. Med. Jour., Nov. 5, 1921, p. 734.

Siegrist, A. Keratoconus. Heidelberg. Ophth. Congress, 1920, p. 340.

Stock, W. Correction of keratoconous with contact glass. Heidelberg Ophth. Congress, 1920, pp. 352-354.

Uhthoff, W. Epithelial dystrophy of cornea. Heidelberg Ophth. Congress, 1920, p. 308.

Wolfrum. Regeneration of cornea. Heidelberg Ophth. Congress, 1920, pp. 332-334.

Woodruff, H. W. Iodin in corneal ulceration. A. J. O., v. 4, 1921, p. 917.

Zentmayer, W. Groenouw's nodular keratitis. A. J. O., v. 4, 1921, p. 923.

Zbikowski. Symmetric anterior ectasia of sclera. Rev. Med. de Sevilla, v. 40, 1921, pp. 16-18.

THE ANTERIOR CHAMBER.

Behl, C. Lid closure reaction of pupil. Heidelberg Ophth. Congress, 1920, pp. 189-196.

Gilbert, W. Studies of aqueous humor. Heidelberg Ophth. Congress, 1920, pp. 68-73.

Kubik, J. Anatomy of angle of anterior chamber. (Dis.) Heidelberg Ophth. Congress, 1920, pp. 33-49.

Lindner, K. Study of changes in ocular fluids. (4 ill.) Heidelberg Ophth. Congress, 1920, pp. 33-49.

Wessly, K. Question of iris dilatator and anterior chamber in human eyes. (1 ill.) Heidelberg Ophth. Congress, 1920, pp. 26-33.

Westphal, A. Pupil phenomena in epidemic encephalitis and "alternating absolute" rigidity of pupil. Zeit. f. d. g. Neur. u. Psychiat., v. 68, 1921, pp. 226-240.

THE UVEAL TRACT.

Buck, R. H. Uveitis with vitreous opacities. A. J. O., v. 4, 1921, pp. 906-909.

Frede, N. di. Malarial iritis. Boll. d. Clin., v. 38, 1921, pp. 208-209.

Gilbert, W. Benign tubercular meningitis with acute choroiditis. Deut. Arch. f. klin. Med., v. 137, 1921, p. 21.

Hunter, W. B. Traumatic aniridia. Brit. Med. Jour., Nov. 19, 1921, p. 843.

Peter, L. C. Obscure forms of posterior uveitis, their relation to sinus disease. Penn. Med. Jour., v. 25, 1921, p. 151.

Thompson, H. M. Tuberculous iridocyclitis cured with tuberculin. (Dis.) A. J. O., v. 4, 1921, p. 928.

Acute iritis following arsphenamin. (Dis.) A. J. O., v. 4, 1921, p. 928.

Wallace, F. E. Chorioretinitis. (Dis.) A. J. O., v. 4, 1921, p. 927.

Tuberculous iridocyclitis. (Dis.) A. J. O., v. 4, 1921, p. 926.

GLAUCOMA.

Ascher, K. W. Diminished velocity of red blood cells in glaucoma. (5 ill. Dis.) Heidelberg Ophth. Congress, 1920, pp. 77-84.

Axenfeld, T. High myopia and glaucoma. Heidelberg Ophth. Congress, 1920, pp. 102-107.

Brandt, R. Experience with Elliot trephining. (1 ill.) Heidelberg Ophth. Congress, 1920, pp. 113-117.

Cords, R. Glaucoma and papillitis. Heidelberg Ophth. Congress, 1920, pp. 109-112.

Gifford, H. Peripheral iridotomy (Curran) in treatment of glaucoma. (1 ill.) A. J. O., v. 4, 1921, pp. 889-894.

Hamburger, C. Mechanics of glaucoma and operations. Heidelberg Ophth. Congress, 1920, p. 102.

Hertel, E. Studies of blood and aqueous in glaucoma. Heidelberg Ophth. Congress, 1920, pp. 73-76.

Holth, S. Punch forceps sclerectomy for chronic glaucoma, tangential and extralimbal iridencleisis operations in 1915-1919. (7 ill.) Brit. Jour. Ophth., v. 5, 1921, pp. 544-551.

Koellner. Pupil width and tension in simple glaucoma. Heidelberg Ophth. Congress, 1920, p. 302.

Koeppe, L. Stereomicroscopic picture of angle of anterior chamber with slit lamp in glaucoma. (5 ill.) Heidelberg Ophth. Congress, 1920, pp. 87-101.

Roemer, P. Experiments on hypotonus. (Dis.) Heidelberg Ophth. Congress, 1920, pp. 55-60.

THE CRYSTALLINE LENS.

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A METHOD OF PREVENTING LOSS OF VITREOUS.

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ATLANTIC CITY, N. J.

By previously placing a suture, with a knot on it, the corneal incision can be instantly and completely closed to meet any emergency that may arise during operation.

In order to have a suture prevent or aid in stopping already escaping vitreous, it is necessary to be able to act instantaneously. As a rule it takes too long to pick up two ends of a thread, when vitreous is threatening to escape.

For ten years I have studied the various sutures devised for cataract operations, and tried many of them myself, with and without modifications, on animal and human eyes. Several methods answer the purpose very well after operation is completed, when no necessity exists for closing the gaping wound rapidly. The suture described here has been developed after hundreds of experiments on animal eyes, and since then its efficiency has been proved in a number of cataract operations on the human eye, when loss of vitreous seemed imminent. Kalt says: "Once the suture is tied, one is master of the situation." With the suture described here, one is master of the situation, even before tying it. When the wound is gaping or vitreous already escaping, it is only necessary to pull on the long end of the thread and hold it until patient stops squeezing or the situation is otherwise controlled. Even the speculum may be removed safely or the lids closed.

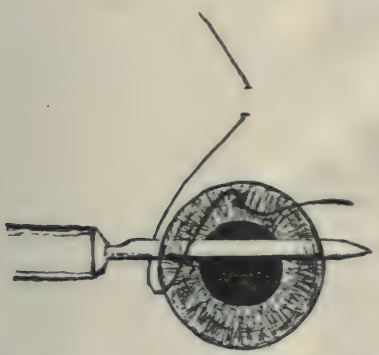

Fig. 1. Suture applied before making incision for cataract operation, drawn aside to be out of the way of the knife, which has been introduced, making the puncture and counter puncture.

To prepare the suture, white silk spool thread, size B and 25 cm. long, is passed thru the eye of the smallest curved needle which will take that size thread. The usual short self threading needles answer the purpose very well. A loop like a single bow knot is tied 10 cm. from one end and drawn out so that a loop remains only 1 mm. long. This loop, or knot, will prevent the thread from slipping thru a hole made in the cornea by the needle. A loop can be eliminated after the operation by pulling on both ends of the thread, but there is no harm in tying the suture right over the loop if it does not pull out readily.

The needle is inserted into the cornea 1.5 mm. to the temporal side and 2.5 mm. below the upper corneal margin, emerging about 1.2 mm. above insertion, without entering the anterior chamber, and the thread pulled thru until the knot is in contact with the cornea. This suture can be placed lower if the operator prefers to have the incision terminate high in the cornea. Now the needle is inserted into the conjunctiva 4 mm. above the limbus, emerging 1.5 mm. above. With a strabismus hook the thread between the corneal and conjunctival insertions is pulled up to form a loop 12 to 15 mm. long so that the thread can not obstruct the escaping cataract. The

operator is now ready for the incision. The end of the thread which has passed thru the conjunctiva is longer, i. e., farther away from the knot than the other shorter end, which should be laid out of the way across the nose, and not touched until ready to tie the suture after the operation.

At any time during the operation, if necessary to do so, the wound can be closed rapidly by simply pulling in any direction on one end, i. e., the long end of the thread. The wound can be held closed until the patient gets thru squeezing or the situation is otherwise under control, and the toilet of the wound completed after the suture is tied. The speculum may be removed, the lids closed or opened, the iris replaced, and if the capsule has been opened, the remaining debris may be scooped out or removed by irrigation. In dislocated lenses, the loop, or Reisinger hooks, may be introduced and the wound held closed until the escaping lens shuts off the escaping vitreous, and after the lens is out the wound can be immediately closed again by simply pulling on one end of the thread. If the operation has progressed without incident, and the operator is ready to tie the suture, the knot can be eliminated by pulling on short end of the thread also, or it can be pulled away from cornea. But no harm results from leaving the knot in contact with cornea, and tying the suture right over it, on account of the elastic pull of the conjunctiva.

Four years ago I operated on 18 cataracts with thru and thru corneal sutures, i. e., both sutures passing thru the whole thickness of cornea, which I generally removed on the fourth day. Then I had two particularly unruly patients who squeezed so that I left the sutures in eight days, and in each case a severe iridocyclitis developed. This suggested that an ideal suture should be tolerated at least a week without detrimental results, and that it should be elastic. The suture described here has frequently been left in 10 to 20 days without reaction, or until it cuts thru the conjunctiva or cornea, and there is no reason for removing it for at least a week. When one or both eyes are left open protected by a wire mask, the suture generally cuts thru about the fourth day. Scissors are so easily slipped under it, that it is not necessary to mention the suture to the patient until after it is out.

Summary: Instantaneous control of gaping wound of escaping vitreous.

No possible escape of vitreous after the cataract is out, even before suture has been tied.

When necessary to resort to loop or spoon, the wound can be held firmly closed until the escaping cataract closes wound, and again immediately after it is out. This is best accomplished by an assistant holding the long end of the thread in one hand and controlling the size of loop with a small strabismus hook in the other hand. While holding the wound closed by pulling on the long end of the thread, the other end is picked up, and the suture tied.

This procedure does not prolong the operation because the suture can be inserted while waiting for anesthesia of the iris.

PROFESSOR BARRAQUER OF BARCELONA AND HIS METHOD OF PHAKOERISIS.

JOHN O. MCREYNOLDS, M.Sc., M.D., L.L.D., F.A.C.S.

DALLAS, TEXAS.

This paper gives a sketch of Prof. Barraquer and the conditions under which he has developed his operation, which is likely to be of great interest in connection with the Washington Congress. It also gives interesting details with regard to the technic, and estimates of importance by the writer and by Col. Smith.

"Barraquer's method of intracapsular extraction has come to stay" was the terse verdict of Lt. Col. Henry Smith after he had made a visit to Barcelona. And after his own wonderful experience with fifty thousand intracapsular operations according to a method which he has developed and found efficient, this statement carried a tremendous weight of authority, and rather impelled me to undertake a journey of ten thousand miles to see at first hand the salient details of this important procedure, which was first described in the English language about one year ago.

It is refreshing to observe the generous spirit entertained for each other by these two great exponents of rival methods of intracapsular cataract operations. They both have concentrated their talents on the same object, the complete removal of the lens in its unbroken capsule, one solely by expression and the other entirely by traction.

It is not my purpose at this time to enter into a discussion of the relative merits of the two procedures. This I may do at a future period, when I shall have accumulated sufficient data upon which to base a just and comprehensive analysis. When properly understood and properly applied, they both contribute immensely to our resources in dealing with the most interesting surgical problem in Ophthalmology. For the present I shall be content to give some of the outstanding features of the Barraquer method, and the conditions under which his investigations have been developed, because the latter have an important bearing upon the former.

Fig. 1. Hospital at Barcelona, Spain, in which the work of Professor Ignacio Barraquer has been done.

It is remarkable that the three men, whose labors in practical ophthalmic surgery have attracted perhaps the most widespread interest in the last quarter of a century, have been men who have in a sense been similarly situated. They have all been located in cities out of the beaten paths of ophthalmic pilgrimages; Lt. Col. Henry Smith of Jullundur in the Punjab, Lt. Col. Robt. Henry Elliot in Madras, and Prof. Ignacio Barraquer in Barcelona. Their curacy and system hardly surpassed in any part of the world. The methods of diagnosis and study have brought into requisition the most complete array of scientific apparatus that could be found, and thus every opportunity was provided in advance for the younger Barraquer that improved facilities or inspiring example could offer.

Coupled with these should not be omitted the direct personal interest

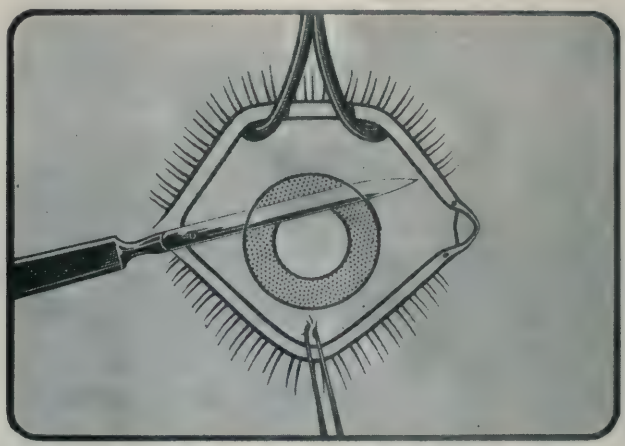

Fig. 2. Making the corneal incision. Point of knife elevated to make nasal end of incision first.

environments were similar in the respect that they commanded a large area comprising many millions of people, that they were practically supreme in authority in their respective domains, and had a free hand to develop procedures unhampered by constant contact with the influences of precedent and revered traditions.

It is proper here to point out the special advantages that have surrounded Barraquer. He lives in the commercial metropolis of old Spain, and thither come the blind not only from the millions in Spain, but from her far flung colonies in South America and the Islands of the Southern Seas. His father, Jose Barraquer, still alive and active, for forty years has been a patient, scientific and progressive ophthalmologist in this capital of the Catalunans. His myriad of pathologic and histologic specimens have been prepared and preserved with an accuracy and system hardly surpassed in any part of the world. The methods of diagnosis and study have brought into requisition the most complete array of scientific apparatus that could be found, and thus every opportunity was provided in advance for the younger Barraquer that improved facilities or inspiring example could offer.

Coupled with these should not be omitted the direct personal interest and stimulation that an intelligent and ambitious better half could bring. It is no wonder, then, that a mind naturally acute, and a physical constitution sensitive to the delicate variations of success and failure, should have embarked upon the sea of investigation with an unusual spirit of enthusiasm and patient endeavor. There is a certain sentiment of adventure in the Spanish temperament that did not die out when Isabella Queen of Spain was the only one in all the world who was willing and able to lend the necessary aid to Columbus, that resulted in giving to mankind the western hemisphere with its long train of epoch making conquests in the new world.

In this somewhat isolated realm, Ignacio Barraquer took up the work of his distinguished sire, and has built upon this foundation a structure of such finished design and careful execution that it must endure. Of course there

is nothing distinctly original in the conception. The Pagenstechers, Hulen, and many other ophthalmologists have recognized the merits of the objective sought, but the peculiar opportunities of Barraquer and his persistent and sustained efforts have contributed in an unusual degree to the final result.

His procedures begin with a rather exhaustive study of each individual case, omitting no feature of a comtial test, it is treated with free irrigation with bichlorid of mercury solution 1 to 3000 (followed with frequent irrigations with normal salt solution) and the application of silver nitrat to the lid margins only, until it is established that the eye is practically free from the danger of infection from the tissues themselves.

The immediate preparation of the eye consists in the instillation of drops composed of cocain, euphthalmin, and

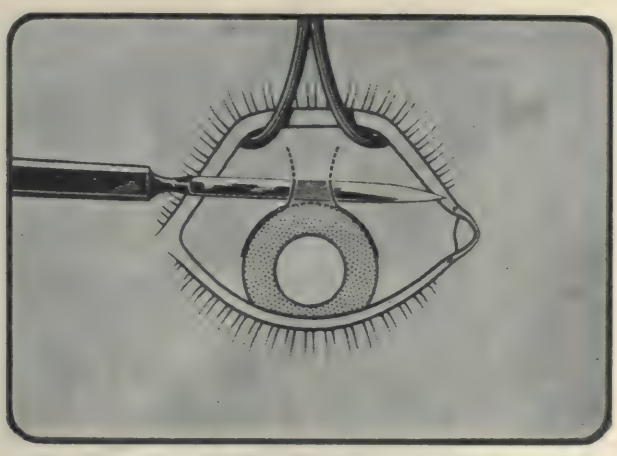

Fig. 3. Incision complete in corneoscleral junction. Knife cutting conjunctival flap.

plete examination, and providing against every reasonable contingency by a careful preparation of the patient, the surgeon and everything that comes in contact with the operative field.

The various sources of autoinfection are investigated and if possible removed. The eye to be operated is tested practically by the application of a bandage for twenty-four hours, to develop any individual tendency on the part of the patient or the eye to interfere with a successful termination. Any morbid process or pathologic bacterial invasion receives special attention before any operation is made, and only one eye at a time is operated on account of the possibility of an unsuspected expulsive hemorrhage, or other disaster that might be averted in the case of the second eye, should this become imminent from the experience with the first one. If the case shows any pathogenic bacteria after this iniadrenalin at intervals during a period of two hours. This procedure he feels secures a deeper anesthesia, a greater safeguard against annoying hemorrhage and a wide dilatation of the pupil, which, however, after the completion of the operation permits the action of eserin to become effective in contracting the pupil. The face is adequately covered with sterilized towels, and the conjunctival sac again thoroly irrigated with normal salt solution, after the folds of the superior retrotarsal conjunctiva have been smoothed out by everting the tarsus with appropriate forceps. All instruments, solutions and dressings are sterilized by heat in the usual way. The hands of the operator and assistant are cleansed with soap and water, then immersed in bichlorid solution and then in alcohol, and then dried with a sterile towel. The surgeon and assistant wear white cotton gloves, and

a mask of white cotton cloth covers the head and face with the exception of the eyes. The assistant, standing to the right of the patient, with one thumb firmly depresses the lower lid, thus controlling the inferior fibers of the orbicularis, and also elevates the upper lid with a Desmarre's retractor, while exerting some upward pressure on the brow with the other thumb, thus completing the control of the orbicularis palpebrarum.

ing a superior conjunctival flap sometimes small and sometimes rather large. Then with de Wecker's pince ciseaux, he elevates the conjunctival flap and reflects it over the cornea so as to get a good view of the iris, which is now caught with delicate forceps gently but firmly near its ciliary attachment. This little piece of iris tissue is cautiously lifted up and excised with the scissors at hand, leaving the sphincter untouched if possible, so as

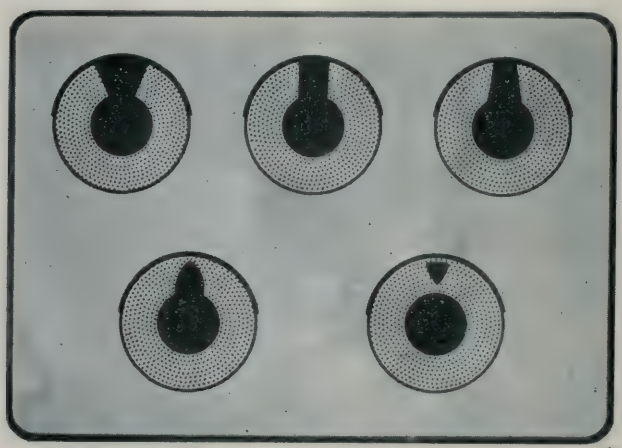

Fig. 4. Different forms of iridectomy. Upper row removal of complete segment of iris of various sizes. Lower row division of sphincter (left) buttonhole outside of sphincter (right).

Immediately preceding the operation, the surgeon makes three injections of a solution of novocain, 1/2 of 1%, into the tissues of the exterior and lower areas surrounding the eye, in such a way as to temporarily paralyze the filaments of the facial nerve supplying the orbicularis. This effect varies somewhat with different patients, but usually results in a condition which not only prevents spasm, but barely permits the gentle voluntary closure of the lids, and this continues for about thirty minutes.

The surgeon standing back of the patient at his head, using his left hand, grasps with forceps the tissues just below the limbus while with his right hand he makes his incision with an ordinary Graefe knife, making his puncture and counter puncture in the limbus, and completing his section upward following the limbus, and providto make a button hole peripheral iridectomy. This, of course, is sometimes difficult to execute exactly as desired, especially unless the patient is under good control. The scope of the corneal incision is intended to comprise something less than a semicircumference, approximately the upper 2/5 of the cornea. The fixation forceps now release the globe, and the patient is directed to look straight forward and then a little downwards, but never strongly downwards as is sometimes done. He clearly illustrates how a strong downward movement causes the corneal wound to gape, with the consequent danger of loss of vitreous.

The surgeon with his left hand now takes hold of the Desmarre's retractor controlling the upper lid, and with his right hand introduces the suction cup thru the corneal wound obliquely, at an angle of 45° with the vertical meridian.

The cup is carried downwards and forwards to the area of the dilated pupil, and then gently insinuated a little further down underneath the lower margin of the sphincter of the iris. Then with a very gentle movement the cup is made to rest accurately upon the anterior surface of the lens, without exerting any pressure which might produce a premature dislocation of the lens with vitreous loss. Not until he is sure of the accurate application of the suction cup to the surface of the lens, should the button be pressed to turn on the current with the resulting traction on the lens. If suction is exerted before accurate adjustment is made something besides the lens may be drawn within the cup, namely, the iris or the vitreous. It is extremely necessary that the vacuum produced shall be proper in quantity and in quality, otherwise the capsule may be ruptured, the lens may be dislocated improperly and vitreous lost.

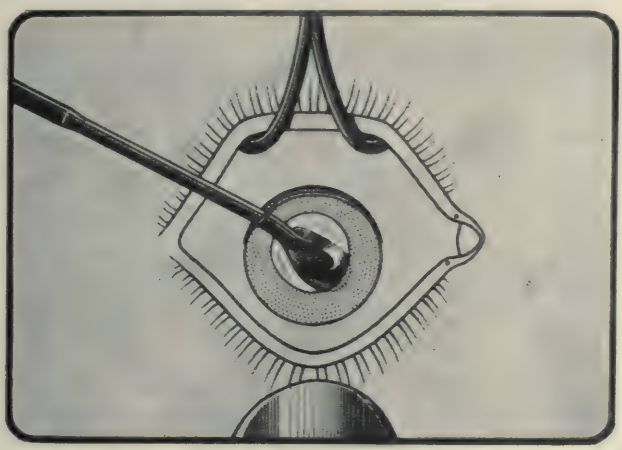

Fig 5. Cup introduced in anterior chamber and pushed through the pupil so that its margin is behind the edge of the iris. It should be well in this position before any attempt is made to seize the lens by suction.

Barraquer maintains that it is essential that one should use an adjustable vacuum to which can be communicated vibrations corresponding in frequency and amplitude with the elasticity of the crystalline lens. Using Barraquer's exact words, "We must try that our vacuum be isochronally vibrating with the vibrations peculiar to the elasticity of the cataract, not only in order not to break the capsule, but also in order that the contact may be more intimate." The vacuum intensity varies from 55 to 65 c.m. of mercury. In no case is it wise to fish around in an eye with a vacuum canula in the hope of catching the lens, because one may catch too many other things first. If the lens should be dislocated prematurely, either from failure of the instrument to function properly or from some altered state of the interior of the globe, it is best to do as I have seen Barraquer do under such circumstances, make a spoon delivery according to the method of Col. Smith or some other similar method.

There are two distinct ways of delivering the lens after it has been securely grasped by the suction cup. If an ordinary complete upward iridectomy has been made the method of election is to slightly advance the position of the cup so as to put on the stretch and then rupture the superior fibers of the zonule, and then gently tilting forwards the superior margin of the lens so as to clear the upper lip of the corneal wound, slowly withdraw the instrument in an upward direction so as to deliver the lens with its superior edge first.

If, however, a simple extraction is attempted, or a button hole iridectomy has been made, the lens should be de-

livered with its inferior margin first. In other words it should be made to tumble thru an arc of 180° around the transverse diameter of the lens. This is accomplished simply by rotating the canula and cup with the attached lens in such a way, that the inferior margin of the lens breaks away from its moorings, and advances forward from behind the lower segment of the iris into the anterior chamber against the posterior surface of the cornea, and on out thru the corneal opening. Then the remaining fibers of the zonule are readily broken in this process of rotation of the lens. In any case the iris should be carefully adjusted in its proper position after the delivery of the lens.

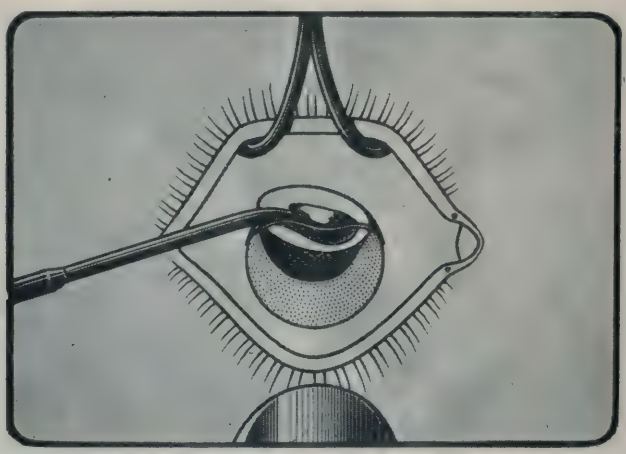

Fig. 6. Method of delivering the lens by turning forward its upper edge after complete upward iridectomy.

Barraquer feels that the simple extraction is followed too frequently by iris prolapse, and that a complete iridectomy involving the sphincter not only takes away the important function of the iris in the regulation of the entrance of light, but also predisposes to a secondary glaucoma, from incarceration in the corneal wound of fibers of the zonule or the iris, and moreover impairs the efficiency of miotics in combating glaucomatous manifestations. So he prefers when possible a peripheral button hole iridectomy. In making his corneal incision, he uses his right hand for the right eye and the left hand for the left eye, but always the right hand for manipulating the cup bearer.

In addition to the details of the procedure as outlined by Barraquer himself, there are certain features that have been impressed upon me as a result of my limited observations of this method in the hands of Barraquer, and also from my own brief experience with the erisiphake in different varieties of cataract. It must be clearly understood that it is not applicable to all kinds of cataract, but only for uncomplicated senile cataract, generally in patients above 50 years of age. It is especially contraindicated in the cases of dislocated lenses and in cases of posterior synechiae. It is applicable in Morgagnian cataract and in immature cataract not associated with vitreous or uveal lesions. It would be a prudent provision to have at hand an extra instrument in case the delicate mechanism should become temporarily impaired.

But the feature that should be most positively emphasized is that success requires not only a reasonable familiarity with this particular method, but an extensive experience with the entire subject of cataract. In fact, it must be admitted that while intracapsular removal of the lens is the ideal result to be achieved, all forms of this operation are more difficult and demand greater dexterity than the regular capsulot-

omy method. It would be very hazardous indeed to undertake any kind of intracapsular operation without being prepared to deal promptly and effectively with any variety of complication that might unexpectedly develop.

It is not the purpose of the writer to present an analytical review of the Barraquer operation at this time, but in the interest of fair judgment and the welfare of patients that may be operated according to this method, it might not be out of place to suggest a few facts that may help to govern an undue enthusiasm with its possible resultant reaction.

1. It must be remembered that the instrumentation in this operation is largely within the eye instead of exterior to it, and that the toleration of traumatism is accordingly very much reduced. The exterior of the cornea, if kept moist, will stand an immense amount of rubbing with a perfectly smooth instrument, as is shown sometimes in the Smith operation, but the delicate endothelium upon the membrane of Descemet if only slightly disturbed may lead to important corneal changes.

2. Each time the suction cup is introduced within the anterior chamber there is an added hazard of injuring the endothelium and of introducing infection.

3. If the suction is in progress and the cup is in the anterior chamber but is not grasping the lens, there is danger, by virtue of the negative tension thus induced, of drawing into the anterior chamber foreign material from the surrounding area which could not improve the prospect for the final result.

The above figures represent the successive steps in the technic of Barraquer's operation for intracapsular extraction of cataracts. Figure 7 shows the position of operator and assistant with the operative costumes worn.

Fig. 7. General position of surgeon, assistant and apparatus during extraction of the lens by suction.

ADDENDUM

In a recent issue of the British Journal of Ophthalmology, Lt. Col. Henry Smith of London has made some observations on the Barraquer method of cataract extraction that are of such value, that I feel impelled to call attention to them in this brief review of the subject. He says, in part:

"I had the pleasure of seeing Dr. Barraquer operate in his own clinic at Barcelona in the spring of this year. . . .

"The principle of his instrument, raising a vacuum to a given tension

and maintaining it at that tension without exceeding it, is perfect.

"A Bunsen pump will do the same thing and will do it nearly as well. The great weakness of the instrument is that the valve is in the hand piece. This necessitates bringing the muscles of the forearm strongly into action, and maintaining that action in keeping the valve closed. This causes the operator to have a stiff wrist, and to use the muscles of the forearm in performing the operation, whereas not a single muscle of his forearm should ever be used in a cataract operation. The muscles of the hand, alone, should be used if we wish to have the necessary lightness of touch and dexterity. The valve should be foot controlled, not hand controlled. . . .

"The chief thing which stimulates me to write this article is that I have heard complaints of an undue number of cases of detachment of the retina after the use of this instrument. I am very anxious to assist anyone who is trying to extract cataract in the capsule by any method. If it is realized that the mechanics of this operation and of the one I have worked out are exactly the same, and the knowledge properly applied, then we will hear less of such trouble as detachment of the retina.

"In my method we put pressure on the lower third of the lens thru the cornea, and continue that pressure thruout at right angles to the anterior surface of the lens as it emerges. This causes the lens to swing round on its transverse axis. The suspensory ligament is thus ruptured first opposite the middle of the wound. The Barraquer instrument should grip the front of the lens and then be rolled between the fingers so as to do exactly the same thing. As used by some operators when it gets its grip it is made simply to lift forward the lens. By this means a temporary vacuum is produced behind the lens, which ipso facto lifts forward the vitreous body, and hence dislocation of the retina or even the choroid. When, however, it is made to roll on its transverse axis so as to rupture the suspensory ligament at the wound first, the air passes behind the lens and no such vacuum lifting the whole contents of the eye forward comes into action. This is the essential point to keep in mind when using this instrument."

VACUUM EXTRACTION OF CATARACTS.

CLYDE ELLIOTT McDANNALD, M.D.

NEW YORK CITY.

Certain modifications in the instruments for securing a vacuum in the Barraquer suction extraction of cataract are here suggested. The method of controlling this vacuum is believed to be more simple and efficient than that of Barraquer.

The intracapsular extraction of cataracts became a matter of extraordinary interest to me last fall, after reading Dr. Ignacio Barraquer's article on this subject which appeared in the October issue of the "American Journal of Ophthalmology," where, under the title "Phakoerisis," he described a method of procedure quite new in many respects. In the December, 1910, issue of the "Ophthalmic Record," Dr. Vard Hulen of San Francisco reported a new operation for extraction of cataract in its capsule by what he termed the "Vacuum Method." It, however, remained for Doctor Barraquer to revivify this process and develop a dependable technic.

After making a careful study of Doctor Barraquer's instrument from the halftone cuts that were employed by him to illustrate his operation, I concluded that a simpler device could be substituted. With this thought in mind, I visited a jeweler and laid before him Doctor Barraquer's article with my own suggestions as to the

modifications of the instrument described.

The instrument employed by me consists of a hollow metal handle to which is attached a tapered silver canula three cm. long, the smallest outside diameter of which equals one and one-half mm. One cm. from the end the canula is bent at an angle of approximately ten degrees; the end is flared out, and in this broadened end is fashioned an oval suction cup, two and one-half mm. in width by three mm. in length and one-half mm. in depth. The entire instrument is twelve cm. long.

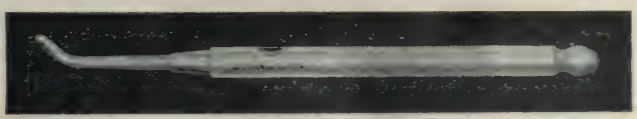

Fig. 1. McDannald's suction instrument for vacuum extraction of cataract.

Four cm. from the end of the suction tip, a four mm. opening is made in the large tube or handle.. This hole is situated where the index finger can easily be slipped over it for the purpose of making and breaking the suction, in this way eliminating the valvular mechanism referred to by Doctor Barraquer as being necessary for the proper manipulation of his instrument. The handle of the instrument is inserted into the open end of a rubber connection tube which is attached to a rarefication pump. (I use a No. 50 Sorensen pump.) When the finger is placed over the opening in the handle, it acts perfectly as a valve, thereby making it possible to control the suction at will without stopping the pump. The amount of vacuum is regulated by the interposition of a vacuum control gauge, which should be set at from ten to fifteen pounds, according to the assumed density of the lens.

Since designing this instrument, I have operated successfully upon a number of cases of cataract with it. The technic employed is my own. In the use of the instrument the first problem for consideration is the selection of cases. My experience leads me to the conclusion that intracapsular extraction should be limited to certain types of cataracts. For instance, the hard, sclerosed lenses have proved the easiest to remove. Next, the hypermature lenses, in which the capsule has become somewhat thickened, stand this method very well. In the mature senile type, where the capsule is very brittle, the suction cup often will lift out a section, resulting in capsulotomy. Sometimes in such cases I have reapplied the instrument and had it adhere sufficiently strongly to the nucleus to enable its removal. It is better, however, to discontinue the vacuum and deliver by expression. Patients sixty or more years of age lend themselves best to this procedure, as the zonular fibers are more easily ruptured after this period of life.

When possible, I perform a preliminary iridectomy but often do the combined operation. So far I have attempted no simple extraction. The preparation of the patient is the same as in any other method.

The section should embrace one-half of the cornea and, if possible, preserve a conjunctival flap. Where it is difficult to make a full size section, the Stevens scissors are employed to enlarge the wound. The speculum is then removed and an iridectomy performed when making a combined operation. If there is a slight bleeding into the anterior chamber, the blood should be removed by irrigating with saline solution.

The instrument is introduced by gently lifting the corneal flap and passing the cup of the vacuum extractor down over the anterior surface of the lens to a point a little below its equator, where it is placed lightly in contact with the anterior lens capsule. The latter is very quickly picked up

when the index finger is slipped over the opening in the handle of the instrument. The instrument is then moved from side to side and up and down without backward pressure being exerted at any time until the lens is loosened in its *patellar fossa.* Then by a lifting movement, it is caused to emerge from underneath the upper scleral border, and is gently withdrawn. The iris requires very slight replacing. The cornea may or may not collapse and occasionally there is a large bubble of air present, which does no harm.

I have not had any cases of inversion of the iris. Once the operation was followed by intraocular hemorrhage, after the patient had been returned to bed; and in another case the vitreous was picked up when making a second attempt to take up the lens after it had been dropped.

After replacing the iris, atropin is instilled and the usual cataract dressing applied. The most troublesome after results have been the appearance of a rather obstinate, striped keratitis and, in a few instances, a prolonged low grade cyclitis with the appearance of vitreous opacities. Iritis has not seemed to be of much consequence. The visual results, as might be expected in the uncomplicated cases, are excellent. I believe this method of treating cataracts possesses very satisfactory possibilities when employed in properly selected cases.

VACUUM METHOD OF INTRACAPSULAR CATARACT EXTRACTION.

A. S. GREEN, M.D., AND L. D. GREEN, M.D.

SAN FRANCISCO, CALIFORNIA.

This paper calls attention to some dangers of suction extraction of cataract. It suggests precautions to be taken and a modification of the apparatus for securing a vacuum and the control of the vacuum.

The intracapsular cataract operation as advanced by Barraquer has recently received a great deal of attention, and since his erisiphake has been placed on the market a great many ophthalmologists will undoubtedly undertake to operate with it, without fully understanding its limitations and dangers. Realizing that many eyes may be sacrificed on that account, we are offering this preliminary communication as a warning.

In order to obtain first hand information, one of the writers recently visited Professor Barraquer in Barcelona. The apparent ease with which a cataract was removed with the erisiphake greatly impressed us, as it apparently likewise did many other ophthalmologists in Europe who were privileged to witness Barraquer's operation. However, upon a more careful study of the operation, and its results on a series of forty-six cases which we have operated upon in San Francisco, we have somewhat modified our views, and have reached some fairly definite conclusions. At the outset we can state from careful study and observation, that all forms of senile cataract are not adapted for the Barraquer operation. Its limitations, like those of the Hulen method, are greater than those for the Smith-Indian operation. With a thoro understanding of these limitations, the Barraquer operation (or its modifications) is indeed a valuable contribution to cataract surgery.

While the object of the Barraquer operation, like that of the Smith-Indian operation, is the removal of the lens within its capsule, the effect upon the ocular contents is somewhat different. This is due to the difference in the mechanical principles involved; one depending largely upon expression of the crystalline lens while the other is dependent upon extraction. In the Smith-Indian operation, pressure is applied

at the limbus below, forcing the ocular contents upward and forward. By special manipulation the suspensory ligament is broken and the lens gently massaged into the wound, the cornea is gradually tucked under the lens, which is thus expelled.

As opposed to this, the principle

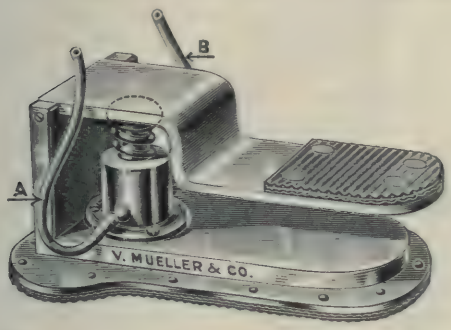

Fig. 1. Foot valve for controlling suction. "A" Rubber tubing leading to motor. "B" Tubing leading to cannula.

upon which the Barraquer method depends—like its predecessors, the Hulen method described in 1910, and other even earlier similar methods—is the application of a vacuum cup to the surface of the lens, suction holding the cataract while it is being removed from the eye. Barraquer claims that an additional and very important factor in his apparatus is, that his electric motor pump transmits a vibratory impulse to the lens which helps to rupture the suspensory ligament before the cataract is withdrawn. Serious consequences may result from either of the methods if too much force is used. If too great pressure is exerted by the Smith-Indian method, an expulsion of vitreous is likely to occur, followed, altho very rarely, by a choroidal hemorrhage. Too much traction on the lens exerted by the suction method may cause a displacement of the entire intraocular contents, that sometimes results in a detachment of the retina. There thus appear certain factors in the two types of operation which are more or less objectionable.

Those who have the Barraquer apparatus will avoid many difficulties if they will observe certain precautions in handling the instrument. The motor pump, as well as the canula of Barraquer, which is manufactured by Cusi, is wonderfully well constructed. The pump is small, compact, beautifully finished and sufficiently powerful if properly handled. It is necessary to use the right amount and quality of oil. We have found that the oil known as "Household Lubricant" of the Standard Oil Company of California answers this purpose admirably. It is advisable to measure the oil for every operation to make sure of the proper quantity in the pump, as some is apt to leak out and insufficient suction result. The canula must be kept clean, the valves in working order and the holes open.

We have been deeply chagrined on attempting an operation to find that there was a little or no suction, due to the fact that the canula leading from the vacuum cup to the handle of the instrument had been clogged by coagulated blood. Since then we have made it a practice to insert a wire into the canula before sterilization. We find it advisable to test the whole vacuum system with a mercury column to determine the degree of suction. If there is a leak, the column of mercury instead of rising to 27 or 28 inches may rise only to 5 or 6 inches. This leak should be remedied before the operation is begun. As an added precaution, it has been our custom to test the suction just before inserting the cup into the eye by applying it to a finger cot partly filled with water and noting the degree of suction.

Fig. 2. Cannula with cup. "A" Actual size of cup.

There are certain mechanical inconveniences that exist in the Barraquer apparatus, that interfere somewhat

with the delicacy of manipulation. To overcome these, we have made some modifications which seem to us to reduce these objections to a minimum. The vacuum in the Barraquer apparatus is engaged or released by pressing on the valve with the thumb. This must of necessity cause a certain cramped position of the hand, and all

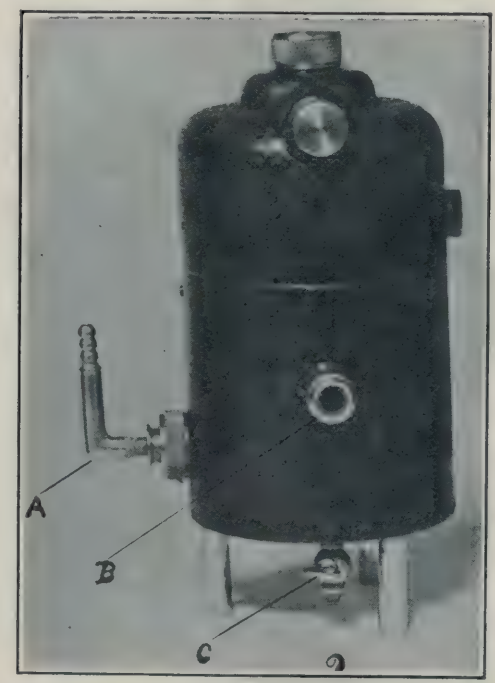

Fig. 3. Barraquer motor pump as modified. A, Right angle connection for rubber tube which prevents oil from dripping out of pump. B, Window in side of pump indicates proper level of oil. C, Stopcock allows easy drainage of oil.

the time the vacuum is maintained, the pressure must be applied until the cataract is extracted. This interferes with the tactile and muscle sensibility of the hand, and in an operation as delicate as is required to extract a cataract, this is certainly undesirable. Furthermore, the mechanism required for such a perfect valve as the Barraquer instrument possesses, makes the instrument heavier than it should be. With these objections in mind, we have devised a floor valve to be controlled by the foot of the operator, thus eliminating the valve in the canula.

We have incorporated an air vent in the valve, which permits the motor to idle without the danger of drawing oil from the pump into the canula, as sometimes happens in the Barraquer apparatus. By transferring the valve from the canula to a foot valve, it permits the use of a very light canula that is held in the fingers as delicately as a cataract knife. We have made the cup round, instead of oval, so that a larger area of the lens surface will be grasped with less danger of rupturing the capsule.

In the Barraquer pump, as at present furnished, we have found it a little inconvenient to let out the oil, which is controlled by an ordinary screw at the outlet in the bottom of the apparatus. To overcome this we have had inserted a small air tight stopcock, which simply requires the turning of the handle to let out the oil. This can easily be attached by any first class mechanic.

TYPES OF CATARACTS SUITABLE FOR INTRACAPSULAR EXTRACTION.

As a general principle which must not be overlooked, only certain types of eyes are suitable for intracapsular operation.

A. It is usually advisable to limit the intracapsular operation to patients over the age of sixty, because the younger the patient the greater the difficulty encountered in breaking the suspensory ligament.

B. Early in our experience with the Barraquer operation, we found that we had to eliminate the tumbler or Morgagnian cataracts from this procedure. The capsules of these cataracts are so friable, that the application of the cup of the canula to the surface of the lens almost invariably breaks it. The effect is usually a partially dislocated lens combined with a poor capsulotomy, with the lens matter, which is very difficult to remove, scattered about in the anterior part of the eye. In these cases the suspensory ligaments, as well as the capsule, are very weak and such cataracts should be removed by the Smith-Indian tumbler procedure, or a capsulotomy done and the lens matter thoroly irrigated from the anterior

chamber. This lens matter from such disorganized cataracts is very irritating to the eye and often produces severe inflammation. Under this type must also be included the "swollen lens," which is an early stage of the Morgagnian cataract, and is indicated by the very shallow anterior chamber and the pearly homogeneous appearance of the cataract.

C. All things being equal, patients with cadaverous or deep set eyes and that when the eyeball is cut open, there exists a far greater danger from expulsion of the intraocular contents than is the case in deep set eyes. This power to increase intraocular tension we have repeatedly demonstrated with the aid of the tonometer.

In delivering the lens by the vacuum method, one of three possibilities may occur, if the suction is strong enough to hold the lens to permit of its removal:

Fig. 4. Apparatus connected ready for use.

lax lids afford the greatest safety. The more prominent the eyeball the greater the danger. A little reflection on the mechanics involved will show the reason for this. In a deep set eye the lids and brow can exert very little direct pressure upon the eyeball because of the poor leverage. On the other hand the lids and brow possess a great deal of leverage with protruding eyeballs. In addition to this, the recti muscles seem to exert great traction on the globe, so that occasionally one may actually see the recession of the eyeball in the orbit at some stage of the operation. All of this combines to increase the intraocular tension, so

1. The cataract may be removed with little difficulty followed by a beautiful result.

2. The capsule may rupture, with the result that a poor capsulotomy has been done.

3. The cataract may be removed, but the strong pull required to break the suspensory ligament may result in a detachment of the retina.

The intracapsular operation affects the ocular contents in different ways. In the Smith-Indian operation it is sometimes necessary to use more pressure to rupture the suspensory ligament and deliver the lens than is absolutely safe. In such cases the whole

vitreous body may be displaced, causing a very much distorted pupil or expulsion of vitreous. To reduce the amount of pressure often used to express a cataract by the Smith method, and the amount of traction sometimes necessary by the vacuum extraction method, we have gradually evolved a technic which is a combination of expression and extraction, thus greatly reducing the dangers inherent in both methods.

METHOD OF PROCEDURE.

Having decided that the case is suitable for the intracapsular operation, the patient is assured of a good night's rest with a sedative the night before the operation. The following morning the lids are injected with 2 c.c. of 2% novocain one hour before operation, and 1 drop of 1% atropin instilled, while 1 drop of 5% cocain is dropped into the eye every 5 minutes for 6 or 8 doses.

The incision, with a conjunctival flap, must embrace the full half of the cornea. For the beginner in this method, an iridectomy is most advisable, as there will be fewer complications during and after operation. The motor is turned on, the conjunctival flap is grasped with forceps in the left hand, the cornea is raised, and the canula, held in the right hand, is introduced and lightly placed upon the cataract. The valve is now engaged and a few seconds allowed for the spoon to become firmly attached to the anterior capsule. If this time is not given, the spoon will simply slide off, necessitating repeated attempts to hold the cataract.

When satisfied that the lens is being firmly held, the canula is gently rolled between the thumb and index finger so that the upper border of the cataract is tilted forward into the wound, at the same time drawing the cataract out of the eye. At the moment when the rotation for the delivery of the lens starts, the left hand releases the conjunctiva, and the curved iris forceps which held it is shifted to the lower part of the eye near the limbus, and by gentle pressure assists in delivering the lens. We thus attain an expression-extraction with a division of the forces in each.

We are deeply indebted to Colonel Henry Smith for many valuable suggestions in the modification of the vacuum apparatus.

RESULTS OF CATARACT OPERATIONS PERFORMED BY COL. HENRY SMITH AT WILLS HOSPITAL, PHILADELPHIA, PA.

WILLIAM ZENTMAYER, M.D.

PHILADELPHIA, PA.

This report of the results obtained in a small series of operations done by Col. Smith is based on a longer observation of the cases after operation than has usually been possible in the practice of the operator. The unfavorable conditions under which he operated are also pointed out. Read before the Section on Ophthalmology, College of Physicians of Philadelphia, November 17, 1921. (See also p. 130.)

In the spring of the present year, the medical profession of the U. S. was fortunate in having as their guest a man whose reputation as a surgeon had made his name an ophthalmic household word. For years his name had been linked, and will always be linked, with a method of cataract operation he had perfected to meet the exigencies of an unusual situation. Ophthalmic literature holds the accounts of many who had visited his Indian clinic and fallen under the spell of his vigorous personality, and had profited by his instructions and generous disposal of operative material to their use.

Because of this and, furthermore, because it was hoped that the results secured by Col. Smith would make a stronger appeal for the operation than had the results secured by the American advocates of the operation, Col. Smith's coming was looked forward to with great interest. Of Col. Smith's visit to Philadelphia I shall speak only of what was seen, what occurred and what resulted at Wills Hospital. It is not necessary to dwell upon personal eccentricities as these, as always, have received more attention than essentials. Nor is it necessary to describe in detail the operation as performed by Col. Smith, but it will not be amiss to critically consider the innovations in the technic and the results secured.

Considering the operation as performed by Col. Smith, one thought is preeminent; that the procedure has been developed by a man of great originality to meet the demands of an unusual situation. A situation which, in the mind of the writer, required that the patient's stay should be as short as possible, that little or no searching study, physical or laboratory be made, little after treatment carried out and above all no secondary operation be called for. The method used in attempting to render sterile, so far as possible, the conjunctival culdesac was probably introduced because of lack of preoperative preparation and postoperative treatment. To the technic for straightening out the folds and recesses of the conjunctival sac, for which there can be nothing but praise, is added the questionable use of a flushing solution of a nature and strength calculated to be very irritating if not destructive to the epithelium of the cornea and conjunctiva, and having in it the possibility of defeating the very end aimed at, prevention of infection.

The method by which the lens is started from its bed and the zonule ruptured calls for a pressure which in most cases is far greater than can with safety be employed, and is much greater than one would be led to expect from the description of the operation.

The toilet of the eye seemed, and in many cases was, of necessity incomplete because of the welling out of vitreous. Often, the upward rotation of the eyeball was carried to such an extreme because of either the threatened or actual escape of vitreous, that the final steps of the delivery of the lens and the replacement of the iris were done in the dark, or so far under cover of the upper lid as to embarass the operator.

As seen by the writer there were many admirable points in the technic which can be used in other methods of cataract extraction, for which we should feel very grateful to Col. Smith. The method employed in flushing the culdesac (aside from the solution); the control of the orbicularis muscle;

the manner in which the upper lid is held away from the globe, permitting the delivery of the lens with the eyeball rotated upwards instead of downwards, as in the older methods in which a spring speculum is commonly used, are all advantageous.

Features which impressed the writer unfavorably were the strength of the bichlorid solution, 1-3000, employed; insufficient anesthesia in some cases; the way in which the knife was used in making the corneal section seemed to cause an unnecessary drag on the structures of the anterior part of the globe (it seemed not to be the way in which a knife was intended to be used); the technic of the iridectomy, devised presumably to keep the forceps out of the wound, while ingenious and effective in Col. Smith's hands is at the expense of unnecessary injury to the corneal epithelium; the amount of force often required to deliver the lens, and the incomplete toilet of the eye.

The success of a cataract operation must be judged not alone by the visual results obtained, but also by the possible effects of the operation upon the lasting integrity of the eye.

Judged by this standard is the intracapsular operation as performed by Col. Smith an ideal procedure?

Making due allowance for the handicap imposed by having as assistants men who had no experience with this operation, that the operations were performed amid strange surroundings and that the after treatment was not carried out by the operator, but was delegated to others unfamiliar with the complication, the results in the series operated upon at Wills Hospital by Col. Smith compel a negative answer.

The frequency with which vitreous is lost is the serious objection to this method of operating. Aside from the ill effects due directly to this complication, there is even the more serious one of the secondary consequences which arise from the undesirability or inability to satisfactorily complete the toilet of the eye; this results in entanglement of the iris in the lips of the wound, or to actual prolapse of the iris, as well shown in the series.

Loss of vitreous in any amount is harmful, in large amount it constitutes a menace to the eye, as it may lead to late degeneration of the eyeball, detachment of the retina and choroid and, indirectly from incarceration and prolapse of the iris, to secondary glaucoma and late infection.

SUMMARY VISION OBTAINED

6/6 2 cases
6/9 2 cases
6/12 2 cases
6/15 3 cases
6/20 4 cases
6/30 2 cases
L.P. 2 cases
Not recorded, 1 case.

Vitreous loss, 38%.

Incarceration of iris, including 2 cases of prolapse, 38%.

Secondary glaucoma occurred once.

In 2 cases abscission of the iris was necessary.

In one case iridotomy was necessary.

In most of the cases there remained either vitreous haze or definite vitreous opacities.

TABLE OF CASES.

	Service of	Age	Sex	Eye	Iris	Conditon of Cataract	T	B. P.	Loss of Vitreous	Postoperative Course	Refraction	V
1.	Schwenk	78	M	L	N	Immature	20	190 110	Moderate	Striped keratitis persisted for 1 month. Dense hyaloid membrane.	6 months after operation. +10+2. ax. 180°	6/20
2.	Schwenk	62	M	L	N	Mature	17	220 140	Much	3 weeks later. Some pericorneal injection, white mass in upper part of pupil. Faint fundus reflex.	6 months later. +10+1.50 ax. 180°	6/20
3.	Schwenk	76	M	R	N	Mature	20	180 110	Slight	5 weeks later. Still pericorneal congestion. Marked bulging of upper portion of cornea. Many vitreous opacities.		L. P.
4.	Radcliffe	75	M	R	Sluggish	Mature	22	180 100	None	3 weeks later. Moderate ciliary congestion. Many large vitreous opacities. Faint fundus reflex. Marked striped keratitis.	3 weeks later. +9+2. ax. 180°	6/15
5.	Radcliffe	77	M	L	N	Mature	20	170 100	Slight	3 weeks later. Many large vitreous opacities.	3 weeks later. +17+3.50 ax. 165°	6/30
6.	Radcliffe	73	F	R	N	Mature	17	210 110	None	4 weeks later. Moderate ciliary congestion.	10 weeks later. +10+2.50 ax. 30°	6/12
7.	Parker	74	M	R	N	Mature	22	140 100	None	3 weeks later. Pigment on anterior face of vitreous. Some vitreous opacities.	4 weeks later. +11+2.25 ax. 45°	6/20
8.	Zentmayer	47	M	R	N	Immature	14	190 110	None	16 days later. Slight pericorneal injection.	16 days later. +11+2.75 ax. 165°	6/9
9.	Zentmayer	39	M	L	N	Mature	17	180 110	None	30 days later. Prolapse of iris.	6 months later. +10+1.75 ax. 180°	6/6
10.	Zentmayer	69	F	L	N	Hypermature nasal field contracted	24	180 120	None		16 days later +9+4. ax. 180°	6/20
11.	Griscom	51	M	R	N	Immature	28	190 120	Much	4 months later. Prolapse of iris. Continued low grade iridocyclitis. Iridotomy. Capsule adherent to iris divided. 6 months after operation, eye quiet.	6 weeks later. +9+2. ax. 75°	6/30
12.	Griscom	71	M	L	N	Mature	21	160 90	None	15 days later. Eye quiet.	+6+2.50 ax. 15°	6/9
13.	Pontius	79	M	L	N	Mature	17	200 120	None	17 days later. Incarceration of pillar of iris.	17 days later. +7+6. ax. 10°	6/12
14.	Pontius	76	M	R	N	Immature	17	190 120	None	Marked striped keratitis. Incarceration of pillar of iris.	2 months later. +12+0.50 ax. 30°	6/15
15.	Pontius	56	F	R	N	Mature	21	210 140	Moderate	2 days later. Incarceration of both pillars of iris.		L. P.
16.	Holloway	59	F	L	N	Mature	21	170 100	None	2 days later. Incarceration of both pillars of iris.	1 month later. +10+1. ax. 180°	6/15
17.	Holloway	66	F	R	..	Mature	28	180 90	Moderate	12 days later. Incarceration of both pillars of iris.	Not recorded	Not recorded
18.	Holloway	72	F	L	..	Immature	..	...	None		30 days later. +9+4. ax. 150°	6/6

It should also be noted that in Case 9, five months later, there was secondary glaucoma and a prolapse was abscised with a conjunctival flap. In Case 16, fourteen days after operation, iridectomy was done with a conjunctival flap. In Case 17 and Case 18 preliminary iridectomy had been done.

SNOWBALL VITREOUS OPACITIES—ADDITIONAL CASES.*

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This paper adds reports of four cases to those previously published. It discusses the character of the opacities and their probable etiology.

Three years ago I placed on record four case histories of the condition described by Benson as Asteroid Hyalatis or Snowball Opacities of the Vitreous; and when doing so pointed out that while I was confident that these differed from the cholesterin crystals sometimes seen in this structure, they developed in the presence of the same general and local clinical conditions.

My personal experience seems to indicate that at least two types of opacities that may be differentiated clinically have been grouped under the term of synchysis scintillans; first, those that are typical cholesterin crystals, and secondly, those opacities that to my mind are not cholesterin crystals but typical or atypical types of snowball opacities. Why should they not be differentiated?

Judging from the literature, one would imagine that the condition under discussion was a rare one, since but fourteen cases have been recorded. This I believe to be far from the truth, since ten cases have been personally observed in the past twelve years, while during the same time I have not seen more than two cases of cholesterin crystals in the vitreous. As a consequence, I have almost come to the conclusion that deposition of cholesterin crystals in the vitreous is an unusual manifestation, whereas these snowball opacities, either in the early stage or when well formed, are by no means as infrequently encountered.

While a clinical differentiation, in the light of our present knowledge, is of no significance, the difference between these two types of opacities, as they appear to me, is just as striking as the difference between a piece of tinsel and a tiny cotton ball, or cholesterin in the retina and a white punctate exudate.

*Read before Section on Ophthalmology, Philadelphia College of Physicians, April, 1921.

Since my last report, six cases have been observed by me; one patient's report is not available for review and another record has been mislaid, the remaining four are as follows:

CASE I.—J. H. S., aged 56, was referred to me in October, 1904, by Dr. Wharton Sinkler. He was seen at more or less regular intervals up to 1916. From the time of his early examination, his pupils were of the miotic type, unequal, of somewhat irregular contour, with sluggish reactions. In the left eye in the peripheral nasal field, several well defined choroidal erosions could be seen. The discs were healthy. Full visual acuteness could be obtained by a compound hyperopic correction. The case was specific. In later years he developed incipient lens changes and well defined evidences of sclerosis of his retinal vessels, but no hemorrhages or exudates.

In 1915, he was in a hospital for two weeks owing to bladder trouble, and while there a serum and spinal Wassermann were found to be weakly positive. He was given two injections of salvarsan by the Swift-Ellis method.

In 1919 at the age of 70 years, he again returned with a frequent complaint of smarting and burning of the lids and eyeache. At this time, the pupils were as above noted; incipient opacities were present in each lens. The discs were healthy, but scattered about the posterior pole of each eye were a few yellowish pinhead sized lesions, with a large split pea sized choroidal erosion in the right eye and the previously noted erosions in the left. While a few translucent opacities were present in the vitreous of the right eye, the left vitreous contained numerous characteristic snowball opacities.

The vision of the right eye =6/9?; the left eye =6/6?.

CASE II.—C. R. E., aged 60, came to me in April, 1920, complaining of pres-

byopic symptoms. His vision without a correction was 6/6 and 6/6+. He read .50 type at 48 cm. with a +.75 sphere which he was then wearing. The only glass he would accept for distance was a +.25 cyl. ax. 90° and a + 2.00 sphere added gave him a near point of 24 cm., with a range of 46 cm. There were no pupillary or extraocular muscle lesions.

In each lens there could be noted a delicate annular ring in the cortical layers, made up of fine punctate dots, the diameter of the ring being 7 mm. In the right eye, the whole vitreous body was studded with these suspended snowball opacities, usually round, a few oval, but no strands. While searching the extreme periphery of the eyeground, a curious effect was produced by a large cluster of these opacities. They were situated at the extreme limits of perception; and when seen momentarily, and obliquely, they presented the appearance of a whitish expanse or whitish streaks that I first thought was an exudate, but after more minute study the true character of the manifestation could be determined. The disc was of rather mellow type with soft margins, the superior nasal quadrant being a trifle pale; and here and there on its surface could be noted tiny dots, evidencing the earliest visible stages of hyalin deposits. No lesions of the choroid or retina could be detected, and the retinal vessels did not show distinct evidence of sclerosis and might well be called normal for his age, as far as ophthalmoscopic appearances were concerned.

In the left eye the general appearance of the disc was the same as that described for the right eye, but no hyalin points were as yet visible. In the examination of the vitreous, I had about concluded no snowball vitreous opacities were present, when a passing glimpse of the same manifestation noted in the periphery of the right eye, was detected in the extreme lower and outer periphery. A little further study soon revealed a cluster of some half dozen snowball opacities at this site. No changes were seen in the choroid or retina and no distinct evidence of angiosclerosis.

Case III.—J. G., aged 50, was admitted to Dr. Stengel's service at the University Hospital on January 20th. He gave a history of swelling of the legs as early as 1904. In January, 1919, he began to have headaches, palpitation of the heart, and dyspnea had set in about a month before. On January 17, he went to bed feeling as well as usual, but was awakened with a severe pain in the head, and then discovered he could not see with the right eye.

I shall not enumerate the results of the thoro examination except to say that his blood pressure was 205-140. The phenolphthalein test showed but 10 per cent in two hours. The Wassermann test was negative. Blood cholesterol 219 mgm. per 100 cc. He was found to have a chronic diffuse nephritis; arteriosclerosis of the senile type; myocardial hypertrophy and weakness; relative mitral and aortic regurgitation; hepatic enlargement from congestion. For this report and for certain studies, I am indebted to Dr. O. H. P. Pepper.

As to his eyes: The vision of the right eye was reduced to counting fingers at about five inches, while the vision of the left eye was 6/60. When examining this patient, it was noted that, suspended in the vitreous in the right eye, there were numerous white snowball opacities, characteristic in appearance but smaller than usually seen; varying in size from almost pinpoint to approximately 1 mm., a few tending to the elongated or spindle form. The disc has a pale yellowish tint in the temporal portion, better capillarity on the nasal side. There is an excessive angiosclerosis, characterized by silver wire arteries, with irregular caliber in both sets of vessels, and distinct pressure signs of the veins. There is a well marked perivasculitis, especially along the superior temporal veins. Between the macula and the disc there is a large cluster of pinhead sized whitish exudates. A few

of these, less pronounced, can be noted about other portions of the posterior pole. The whole posterior pole on both sides of the disc appears faintly yellowish, and scattered about this area are a number of linear and flame shaped hemorrhages of varying degrees of intensity. I think there is but little doubt that a thrombosis occurred in this eye.

In the left eye a few delicate fine opacities can be noted in the vitreous, but these are not of the snowball type. The disc margins are almost completely blurred by a well marked exudation and striation, which extend well towards the midzones on all sides. Just beyond the disc, superimposed on this exudation, there is a corona of streak and flame shaped hemorrhages. The macular region shows punctate and mass like yellowish white exudates, such as are usually seen in cases of vasculorenal type. A few punctate hemorrhages are scattered among these, The vessels for some distance beyond the disc are partially or completely covered by the uniform yellowish exudate. The vessels show the same excessive angiosclerosis as in the right eye. Some of the major venous branches appear overfilled.

Case IV.—Mrs. E. R.., aged 64 years, first consulted Dr. G. E. de Schweinitz, 1.25.12, for a change in her correction. At that time there were no intraocular changes. She was first seen by me in January, 1918, when her eyes showed incipient lens changes and decided angiosclerosis of the retinal vessels, but no hemorrhages or exudates. The central part of the vitreous of the right eye contained a few snowball opacities, not of advanced type. Opportunities for complete medical studies were not available.

REMARKS.

Recently, Verhoeff[1] has placed on record the clinical notes of a similar case, and owing to the development of an acute glaucoma, he was enabled to examine the vitreous pathologically and microchemically with his usual thoroness. His findings are of particular interest, because it was the first case so diagnosed to come to pathologic examination.

The patient was a male, aged 75, who had a hemorrhagic retinitis when first seen. Snowball opacities were observed in the affected eye only. Verhoeff's studies permitted him to conclude that the opacities, "consist chiefly of calcium soaps, calcium carbonates, and certain amounts of fatty or lipoid substances in combinations of various grades of stability. Their formation is usually, if not always, dependent upon intraocular angiosclerosis in association with an altered condition of the blood." When speaking somewhat more specifically, he refers to "calcium soap, probably calcium margarat, possibly admixed with insoluble compounds of cholesterol and lecithin." Likewise he very aptly points out that "fats, fatty acids, lipoids and lime salts are apt to be deposited where there is deficient oxygen as in necrotic infarcts and scar tissue.

Elsewhere[2] in speaking of synchysis scintillans, the statement was made that some factor must be required to produce it other than the local condition. This I believe to be equally true of snowball opacities, and it prompted my comments upon hypercholesterolemia and diabetic lipemia. Naturally, I am in accord with Verhoeff's belief that it is a degenerative process, but I hesitate to accept the view that intraocular angiosclerosis is the most important factor, altho it is doubtless a conspicuous one.

I venture to say that clinically the condition is not encountered in one percent of the cases of excessive angiosclerosis; neither has it been present in a definite percentage of the cases of thrombotic obstruction of the central artery or vein that I have seen. Still further, it has been observed in cases where there were but slight if any clinical evidences of angiosclerosis, as in the woman aged 35, as reported by Starck, and in Case II of the present report.

Should not more stress be put on the altered condition of the blood, to which both Verhoeff and myself have

referred? Just what this is, or where, why and how certain elements gain access to the blood stream, is still undetermined. Given a case of bilateral excessive angiosclerosis of the retinal vessels, or if you please, of the intraocular vessels, it is just as difficult to explain why the opacities are usually unilateral, as it is to explain it in the presence of a probably much altered blood picture. Considering the ages of the patients usually affected, the relationship of a general arteriosclerosis, as this may affect the functional activity of some distant organ or structure as well as the eye, is not to be overlooked; but here again the important link is missing.

Comment has already been made (previous report) upon the fact that these opacities are not cholesterin as we are accustomed to seeing it. In the light of our present knowledge of the chemistry of the group of substances probably concerned in snowball vitreous opacities, I made the vague, but possibly not far afield, suggestion that these opacities were formed during the same or similar process that has to do with the deposition of cholesterin in the vitreous. What conditions must pertain to the eye, the blood, possibly in the fats or lipoids themselves, if these are the offending agents, and probably in some distant structures or organs, still remains to be solved. If the leads in this branch of chemistry are short and abrupt in their terminations, our clinical interpretations must necessarily be vague and conjectural.

In my previous article I referred to the work of Chauffard and Laroche, and in a recent report on deposits of chloesterin these same two investigators in association with Grigaut[3] point out some interesting observations. They believe that we may have an active hypercholesterolemia which is chiefly of suprarenal origin, that it may be passive owing to hepatic insufficiency, while food hypercholesterolemia may be regarded as a third type. It may exist as a blood manifestation alone, or this may be associated with a tendency to local deposits, as in xanthelasma. As ocular manifestations, they refer particularly to the white patches seen in the retina in cases of nephritis, diabetes and in certain cases of pregnancy. They also comment upon the infiltration of atheromatous arteries with lipoids and among them, cholesterin.

Mention is also made of the experimental work of Anitchkow Wacker and Hueck, who produced arteriosclerosis in rabbits by the injection of large doses of cholesterin. I might add that Mueller[4] of California has shown that the cholesterin fed to dogs was absorbed from the alimentary tract thru the lymphatic system.

As far as I am aware, the cholesterol content of the blood has not been determined in any case of snowball vitreous apacities, prior to this report; and while it was found to be increased in Case III, other clinical findings present tend to oppose its being regarded as having direct relationship.

Altho not particularly pertinent, it is interesting to refer to the recent contribution of Wagener and Wilder in their study of 300 cases of diabetics observed at the Mayo Clinic, 44 of whom showed evidence of retinitis. After referring to the observations of Onfray, Garrod and Moore, they conclude that this manifestation is almost always accompanied by vasculorenal disease and that the pathologic vascular changes are the primary cause.

It is now the vogue to refer various unexplained questions to the realm of the endocrines, and since thinking aloud as well as presenting well conceived ideas is permissible at a meeting of this character, why might not some of the other ductless glands have the same relation to lipoids, as yet unknown, that the suprarenals, according to Chauffard, Laroche and Grigaut, may have to cholesterin?

What conditions might possibly be confused with these opacities?

First, synchysis scintillans, but here the *glittering* shower ought to be distinguished from the almost *dead white* or *lardaceous appearance* of those snow-

ball opacities that are in focus, and the vague corpuscle appearance of those which are not in focus, which gives an appearance somewhat analagous to that of phosphates in the urine. Still further, the snowball opacities when well developed, have a greater tendency to be globular and not flat. The movement in the vitreous is also distinctly different. Hill Griffith has referred to opacities that were white, glistening, round discs. In some of the cases I have observed that certain of the opacities, for they are not all of uniform size, have been small and white and hardly well enough developed to appreciate readily a third dimension, but they have never been glistening and they do not scintillate or sparkle. One cannot study these cases without wondering to what extent, these white opacities may have figured in the controversy as to whether a silver or golden appearance was more frequent in cases of synchysis scintillans.

Second, those rounded and whitish opacities sometimes seen on the surface of detached portions of the retina. In my first report reference was made to a history recorded by D'Oench; and while it was clearly stated that the white dots were scattered over the detached portion of the retina, Valk, who cited the case, assumed they were in the vitreous. These rounded opacities are seen in certain cases of detached retina and are doubtless familiar to all of us. A patient that I now have under observation affords a beautiful illustration of them. These may be the dots to which Elliot refers as observed on the retina in so many of the eyes examined pathologically after couching.

Third, they are not to be confused with the large round corpuscle like vitreous opacity seen in certain of the severer types of uveitis, in my experience chiefly in those of a tuberculous character.

Fourth, when clusters of these opacities occur in the extreme periphery, they might be mistaken in a hurried examination for the margin of an exudate. Case 2 illustrates such a possibility.

Fifth, mention might be made of the small white nodes seen in the vitreous in certain cases of glioma of the retina, such as have been described by a number of observers.

In conclusion, I may say that judging solely from my personal experience, I believe that the type of opacity under discussion has contributed more to the diagnosis of synchysis scintillans than has the actual cholesterin crystal. Verhoeff's observations have done much towards providing more definite knowledge in regard to this condition and it is to be hoped that those who may chance to secure material of this character will afford him further opportunities for the study of these opacities.

Since the above paper was read, I have found an interesting study by Valentin (Hoppe-Seyler Zeitschr. f. physiol. Chemie, 1919, cv. 33) "On the Fat-like Substances Found in the Vitreous Body of the Eye of the Horse." His work was based on a study of more than 200 eyes. In addition to the usual constituents, grape sugar and lactic acid were demonstrated in the vitreous.

In speaking of tyrosin, he concluded that the amount even of combined tyrosin in the vitreous is so slight that its excretion must necessarily be doubtful. The opaque particles were examined in polarized light, with various chemical reagents and with Sudan II, neutral red and Nile blue sulphat. In nearly all the tests, the presence of cholesterol, phosphoric acid, cholesterin crystals, phosphatids, soaps, neutral fats and occasionally glycerinester and nitrogen could be demonstrated. The tests also showed that the fatty and fat like substances in the vitreous play an important part in the turbidity referred to.

As a result of his studies of the normal vitreous, he found that it contained soaps which hold various lipoid substances in solution, such as: glycerinester, cholesterinester, free cholesterin and phosphatid containing cholin.

Under abnormal circumstances these substances, normally held in solution, occur in the form of droplets, and in addition there is an excretion of soaps. The study also shows that the opacities as a rule are not caused by a single substance, but by a combination of several substances, of which sometimes one, sometimes another predominates. All of the substances show lipoid characteristics, sometimes neutral fat, sometimes free cholesterin or cholesterinester or phosphatid. In addition to the flakes (exudate residue) no substances except those of a lipoid nature were found as constituents of the opaque particles, in spite of the large number of eyes examined. Tyrosin was never excreted. The opacities therefore seem to be based on a process analogous to that which causes formation of gall stones from the bile.

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THE VISUAL PATHWAY AND THE PARANASAL SINUSES.

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This address by the Professor of Anatomy of Jefferson Medical College brings into convenient form the leading facts regarding the anatomic relations of the optic tracts, chiasm and nerves to the accessory sinuses and the nose. It was given before the Section on Ophthalmology of the American Medical Association, June 8, 1921, and is published here by courtesy of the Journal of the A. M. A.

Before entering into a discussion of the anatomic relationships which exist between portions of the visual pathway and the paranasal sinuses, it is essential that reference be made to a few cardinal points in the intrinsic anatomy of the visual pathway: The retina from the point of view of ontogenesis or embryology is a part of the brain, and the socalled optic nerve is a brain fiber tract supported by neuroglia and other elements. Moreover, the nerve is surrounded by tubular prolongations of the three meningeal membranes—pia, arachnoid and dura.

The meningeal extensions also prolong the subdural and the subarachnoid spaces along and around the optic nerve as far as the sclera, where they become continuous with the posterior group of tissue spaces of the eyeball (Figs. 1-3).

Strictly speaking, there is nothing in the visual apparatus which morphologically corresponds to a peripheral nerve. The percipient elements—the rods and the cones of the retina—are directly stimulated by the light waves. There is, of course, an analogy between the rods and cones and a peripheral nerve, but they are not morphologic equivalents. Indeed, the retina is not unlike the brain proper, since, it is made up of supporting elements and neurons; the important neurons being (*a*) the rods and cones, (*b*) the bipolar cells, (*c*) the horizontally placed correlation neurons and (*d*) the socalled ganglion cells. The axons of the latter converge toward the optic disc, pierce the vascular and fibrous tunics of the eyeball, and then course centrally as the conventional optic nerve, the optic commissure and the optic tract, to terminate variously in the thalamus, the metathalamus and the midbrain. Since identically the same fibers or axons form without interruption and in order from before backward the optic nerve, the optic commissure and the optic tract, it would be more appropriate to designate the entire pathway the optic tract.

The principal fibers of the optic tract above referred to, together with their cell bodies or nutritional centers in

the retina, are neurons of the third order in the visual pathway. The fibers are medullated in their retro-ocular portions but lack a neurilemma, being in general agreement with brain and spinal cord fiber tracts in which the neurilemma is absent or greatly reduced. It is significant in this connection that nerve fiber tracts of the brain and spinal cord lack power to regenerate from an intact central part, while the peripheral nerve fibers possess this power. While the neurilemma cells and their protoplasmic bands do not form new nerve fibers, they appear to be the deciding factor in nerve regeneration by forming tubelike pathways for the growing central stumps. The optic nerve, commissure and tract behave like a spinal cord pathway as regards regeneration. Therefore, early and proper treatment of diseased topographically related structures of the optic pathway would appear of vital importance.

The optic nerve is said to contain four anatomically and physiologically unlike sets of fibers: (*a*) those carrying visual impulses to the brain; (*b*) those going to reflex centers, e. g., the pupillomotor centers; (*c*) the centrifugally directed fibers; e. g., the socalled retinomotor fibers; and (*d*) the interretinal fibers. From each retina three bundles of fibers arise; (*a*) those from the lateral half going centrally on the same side; (b) those from the mesial half going centrally on the opposite side after decussation in the optic commissure, and (*c*) those from the fovea centralis, in man and monkey, going centrally partly on the same side and partly in the op-

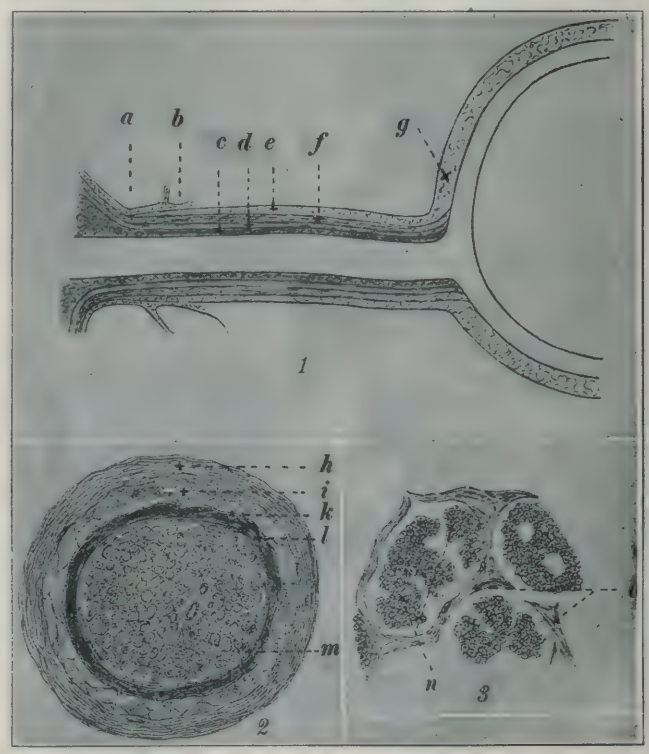

Fig. 1.—Diagram of a horizontal section of the socalled optic nerve and part of the eyeball, showing the relations of the meningeal sheaths and the interfascial spaces; *a*, sphenoidal sinus; *b*, posterior ethmoidal cell; *c*, subarachnoid space; *d*, subdural space; *e*, supravaginal or *a*, extradural space; *f*, dura; *g*, space of Tenon.

Fig. 2.—Cross section of the optic nerve; *h*, dura mater; *i*, subdural space; *k*, arachnoid mater; *l*, subarachnoid space; *m*, pia mater.

Fig. 3.—A considerably magnified portion of a cross section of the optic nerve; *n*, fascicles of optic nerve; *a*, fibrous septa.

posite after decussation in the commissure. It would appear that the several bundles occupy fairly definite and constant positions in the pathway in their course centrally; for example, the macular fasciculus is lateral in position for about half the distance from the eyeball to the optic commissure, while in the remaining portion of the tract it occupies a central position, and is farthest removed from the more abundant peripheral blood supply.

Experimental evidence tends to show that pupillomotor impulses travel centrally to the superior collicular body without decussation in the commissure, the consensual reflex being due to fibers from the superior collicular body going to the pupillomotor centers of both sides. Little is known of the real purpose of the retinomotor fibers; trophic and vasoconstrictor functions have been suggested. The interretinal fibers are even more obscure. It is believed by some that the impulses passing over them have to do with the socalled sympathetic inflammations; others ascribe binocular contrast and after images to them; while a third group of workers believe they convey impulses which cause retinal changes in one eye when light falls on the other.

Therefore, in dealing with the topographic interrelations of the optic pathway and the paranasal sinuses in man, one is concerned with a partially decussated brain fiber tract made up of anatomically and physiologically unlike elements, the cell bodies or nutritive points of most of the neurons being located forward in the retina. Moreover, since the optic nerve segment of the pathway is surrounded by the meningeal layers and their interspaces, whatever may be said regarding the topographic relationships of component neurons of this part of the pathway applies with equal force to the meningeal sheaths and the related intervaginal tissue spaces.

The optic nerve leaves the eyeball approximately 3 mm. to the mesial side of its posterior pole, and follows a slightly flexuous or serpentine course dorsalward, medialward and cranialward toward the optic canal in the apex of the orbit. After traversing the optic foramen medial and cephalic to the ophthalmic artery, the optic nerve courses intracranially, converges toward the midline, and after a variable distance meets with its fellow in the formation of the optic commissure.

It is, therefore, obvious that the two optic nerves are far apart ventrally where they leave the eyeballs and gradually converge more and more, ultimately to merge in the vicinity of the tuberculum sellae (olivary eminence), between the internal carotid arteries. For some distance behind the eyeballs, the optic nerves are separated from the thin osseous walls of the paranasal sinuses by the interposition of a goodly amount of orbital fat. However, as the optic foramen and the optic commissure are neared, the topographic relationships between the optic pathway and the paranasal sinsuses become more and more intimate, ultimately resulting in very many cases in the optic nerve and commissure coming into actual contact with the thin osseous walls or the mucous membrane (when osseous dehiscences are present) of certain of the paranasal sinuses, especially the posterior ethmoidal and the sphenoidal. Therefore, the portions of the visual pathway that particularly concern us in the further discussion of the problem before us are the conventional optic nerve and the optic commissure.

From the point of view of regional anatomy, the optic nerve may be divided into (*a*) intraocular, (*b*) intraorbital (*c*) canalicular and (*d*) intracranial segments. Of these segments the canalicular would appear particularly vulnerable in certain disorders, e. g., in edema of the nerve, since it is surrounded by an unyielding osseous ring or canal. However, apart from this, it matters not what part of the optic pathway (nerve, commissure, tract) is involved, since the cell bodies or chief nutritive portions of the neurons are located in the retina, and no synapse station occurs between the retina and

the primary visual centers. Of course, the precise manifestation would depend on the location of the lesion e. g., at the commissure or in front or back of it.

The combined length of the intraorbital, canalicular and intracranial portions of the nerve varies in different individuals, and to some extent on two sides of the same individual. The intraocular segment of the optic nerve need not detain us here. While the whole nerve varies in length, the greatest variation occurs in the length of the intracranial segment, the optic commissure being formed at a variable distance dorsal to the optic foramen, or better the optic canal. Table 1 is illustrative of this variation.

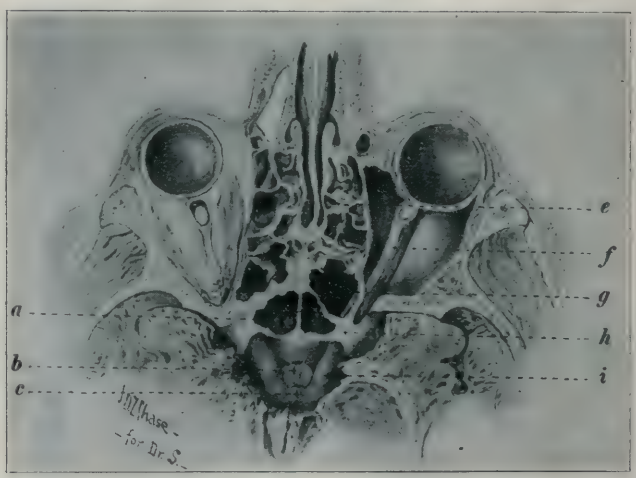

Fig. 4.—A dissection of the optic nerve and commissure and the sphenoidal sinuses and ethmoidal labyrinths; *a*, sphenoidal sinuses; *b*, hypophysis cerebri; *c*, optic commissure; *e*, anterior ethmoidal cells; *f*, orbital segment of optic nerve; *g*, posterior ethmoidal cell; *h*, canalicular segment of optic nerve; *i*, intracranial segment of optic nerve

TABLE 1.—LENGTH OF INTRAORBITAL, CANALICULAR AND INTRACRANIAL PORTIONS OF OPTIC NERVE.

Total Length	Topographic Segments		
	Intraorbital	Canalicular	Intracranial
Mm.	Mm.	Mm.	Mm.
49	27	6	16
38	28	6	3
43	30	5	8
33	25	4	4
46	25	5	16
30	20	3	7

In order to facilitate further consideration of the topographic interrelations of the optic nerve and the paranasal sinuses, it is well to divide the optic nerve into sinus and nonsinus portions, using sinus portion to mean that segment of the nerve which is 2 mm. or less from the walls of certain of the paranasal sinuses. Usually some portion of the segment is in actual contact with the osseous wall or the mucous membrane, either of one of the posterior ethmoidal cells or of the sphenoidal sinus or of both. The nonsinus segment is beyond the arbitrary 2 mm. limit and does not particularly concern us here. It has been observed that the farther removed the optic nerve is from the walls of diseased paranasal sinuses, the less liable the nerve is to secondary involvement. Table 2 is illustrative of the lengths of the sinus and nonsinus portions of the optic nerve as compared with the total length of the nerve from the eyeball to the optic commissure, in a large series of cadavers investigated.

TABLE 2.—LENGTH OF SINUS AND NONSINUS PORTION OF OPTIC NERVE.

	Length of Optic Nerve in Millimeters					
	Total Length		Nonsinus Portion		Sinus Portion	
Cadaver	Right	Left	Right	Left	Right	Left
A	45	45	24	21	21	24
B	37	35	14	13	23	22
C	44	44	21	22	23	22
D	40	40	19	23	21	17
E	55	48	28	27	27	21
F	43	41	15	15	28	26
G	48	46	24	20	24	26
H	39	42	15	14	24	28
I	38	40	16	20	22	20
J	40	40	30	10	20	20
K	37	36	14	14	23	22
L	54	48	28	27	26	21

As shown in Table 2, a goodly segment of the optic nerve is intimately related to the walls of certain of the paranasal sinuses. The actual character of the relationship necessarily is inconstant. The great variation in the size, shape, number and type of the several paranasal sinuses in different individuals, and on the two sides in the same individual, precludes any constancy in the topographic interrelations of the parts concerned. At best the osseous walls of the paranasal sinuses are thin; often of a filmy nature. Again, the osseous walls of the sinuses at places are developmentally defective, leading to a condition whereby the mucous membrane of the related sinuses comes into actual contact with the dural investment of the optic nerve and with the optic commissure. Occasionally the osseous lateral wall of the sphenoidal sinus is so deficient that the mucous membrane, lining its cavity, protrudes as a hernia or a diverticulum. Rarely, of course, very small sphenoidal sinuses are encountered with relatively thick walls, thereby precluding intimate relations with the optic nerve. Here the latter is less likely to become involved in sinus disease. The frequency of involvement appears to be in direct ratio with the intimacy of topographic relationship of the sphenoidal sinus and the optic nerve.

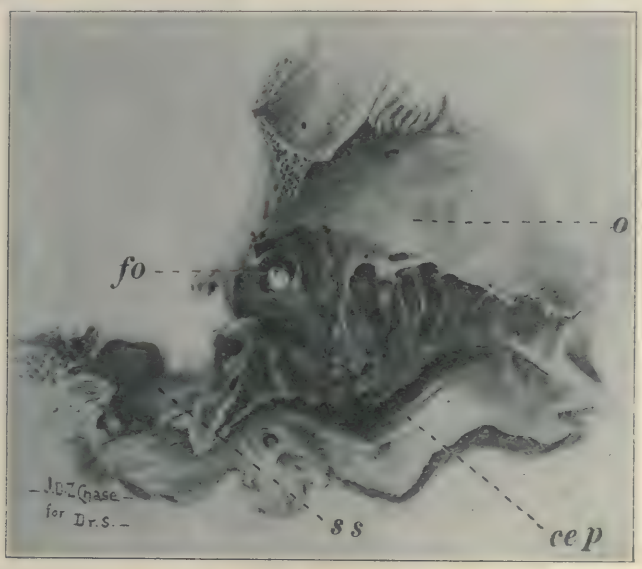

Fig. 5.—Dissection of a specimen in which a large posterior ethmoidal cell encroaches on the usual confines of the shenoidal sinus. Particularly note how the sphenoidal sinus has surrounded the optic canal, resulting in an elongation of the canal and exposure of a considerable segment of the optic nerve to the ethmoidal cell. *fo*, optic foramen or canal; *ss*, sphenoidal sinus; *o*, orbit; *cep*, posterior ethmoidal cell.

One (or more) of the posterior group of ethmoidal cells is nearly always in intimate topographic relationship with the optic nerve. The precise relationship, as stated before, varies. In many instances, the optic nerve molds the lateral wall of the most dorsal of the posterior group of ethmoidal cells, the wall frequently being thrown into moundlike relief by the nerve (Fig. 4). Again, the nerve comes into relationship with two or more posterior ethmoidal cells, depending in a measure on the number of cells differentiated in the posterior ethmoidal labyrinth.

Not infrequently the hindmost of the posterior group of ethmoidal cells is relatively large and encroaches over and under the usual site of the optic foramen. This results in the optic foramen elongating into a true osseous

canal, located in a sense within the ethmoidal cell in question (Fig. 5). This type of cases is very important because the canalicular segment of the optic nerve is markedly increased in length; moreover, in vital relationship with the ethmoidal cell. Indeed, the bone of the canal is often defective and at best of a papery delicacy, thus directly exposing the optic nerve to the mucosal lining of the ethmoidal cell for a goodly distance. In such cases the sphenoidal sinus is crowded from its usual relationship with the optic nerve (Fig. 5).

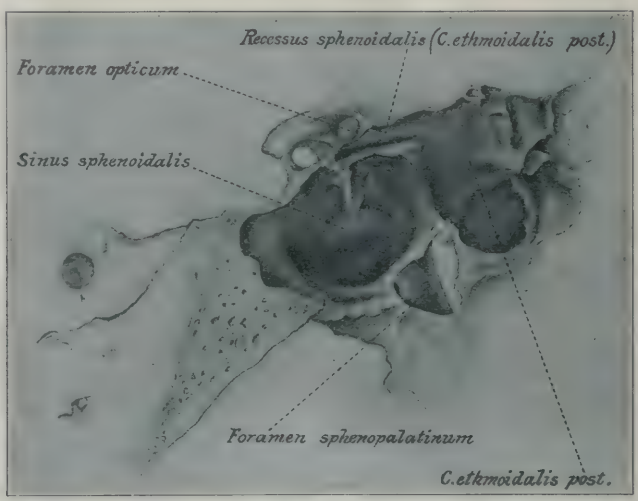

Fig. 6.—Extension of a posterior ethmoidal cell along the optic foramen over the sphenoidal sinus. In this type the sphenoidal sinus does not bear an intimate relationship to the optic nerve.

Another morphologic type of posterior ethmoidal cell encountered is one which extends into the body of the sphenoid over the sphenoidal sinus (Fig. 6). Cells in this position always replace the sphenoidal sinus as regards optic nerve relationship. The type is not uncommon, and it is clearly obvious that one can have a rather aggravated type of sphenoidal sinus disease without involvement of the optic nerve.

In general, it may be said that the hindmost of the posterior group of ethmoidal cells are of most importance in this connection; however, at times other posterior ethmoidal cells not in actual contact with the sphenoidal sinus establish intimate topographic relationships with the optic nerve. The most dorsal of the anterior group of ethmoidal cells occasionally come into fairly intimate relationship with the optic nerve—this when the anterior group of ethmoidal cells encroaches on the more usual confines of the posterior group. It must always be recalled that it is not the location or the topography of the ethmoidal cells that determines the groups, but the location of the ostia of the cells within the nasal cavity. As a rule, however, the anterior group of ethmoidal cells are not a factor, since a goodly amount of orbital fat, etc., is interposed between the optic nerve and the osseous party wall.

The optic nerve variously crosses the upper and lateral angle of the sphenoidal sinus. In very many cases the thin wall of the sinus is pushed into a moundlike relief by the nerve, so that in a sense the nerve passes thru the sinus, being separated from the lumen merely by the thin osseous wall and the mucous membrane or, where osseous defects exist, only by the mucous membrane (Fig. 4). Indeed, it is very common for the osseous wall over the optic nerve to be so filmy in character, that it is almost a negligible factor as a barrier to prevent the spread of infection from a diseased sinus to the optic nerve. Another type of sinus is that in which the optic nerve crosses

the lateral portion of the roof of the sphenoidal sinus; not infrequently more or less suspended in character (Fig. 7).

The asymmetry of the sphenoidal sinuses may be so great that either the right or the left sinus establishes intimate and vital relationships not only to the great variation in the size, shape and asymmetry of the sinuses and, secondly, to the variation in the distance behind the optic foramen at which the optic commissure is formed (Table 1).

In very large sphenoidal sinuses, especially in the ventrodorsal plane, the optic commissure is located in the

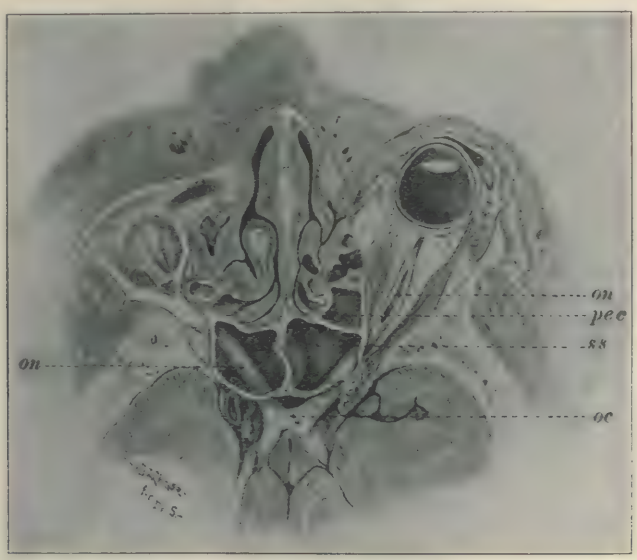

Fig. 7.—Drawing of a cross section exposing the roof of the sphenoidal sinuses. Note the course of the optic nerves. The thin osseous roof of the sinus is pushed into conspicuous relief by the optic nerve. Indeed, at places the osseous wall is defective. This is an extremely common type. *on*, optic nerve; *pec*, posterior ethmoidal cell; *ss*, sphenoidal sinus; *oc*, optic commissure.

with the optic nerve of the same side, but also with the optic nerve of the opposite side. For example, one encounters specimens in which the right sphenoidal sinus comes into actual contact with the right optic nerve, the optic commissure and the left optic nerve; the left sphenoidal sinus being wholly crowded from its usual topographic relationship with the optic nerve of that side (Fig. 8). The opposite anatomy also prevails with equal force. This type would, from an anatomic point of view, explain the bilateral optic neuritis in disease of one sphenoidal sinus; moreover, the escape of the visual pathway should the sphenoidal sinus, not in relationship, be involved.

The optic commissure bears a variable topographic relationship to the paired sphenoidal sinus. The inconstancy of the relationship is due, first, roof of the sinuses, and some distance in advance of the dorsal wall. On the contrary, in smaller sphenoidal sinuses, the optic commissure lies dorsal to the sinuses. When the intracranial segment of the optic nerve is relatively long and the optic commissure formed far dorsad, the commissure rests upon the hypophysis cerebri, and the intimate topographic interrelationship of the optic commissure and the sphenoidal sinuses is thereby precluded (Fig. 9). The location of the optic commissure immediately over the hypophysis cerebri is very common according to the cadavers investigated. It is when the intracranial segment of the optic nerve is short, resulting in the formation of the optic commissure ventral to the location of the hypophysis cerebri in relation to the tuberculum sellae, that the very intimate topographic relationship between the com-

missure and the sphenoidal sinuses is made possible (Fig. 10). Of course, in those cases in which the sphenoidal sinuses extend forward into the ethmoidal mass at the expense of certain posterior ethmoidal cells, the optic commissure is always in the roof of the sphenoidal sinuses.

foramen. As a rule, however, the frontal sinus is not vitally related.

In the vast majority of instances, a goodly amount of orbital fat separates the maxillary sinus from the optic nerve. Rarely, however, when the maxillary sinus pneumatizes beyond the confines of the maxilla into the or-

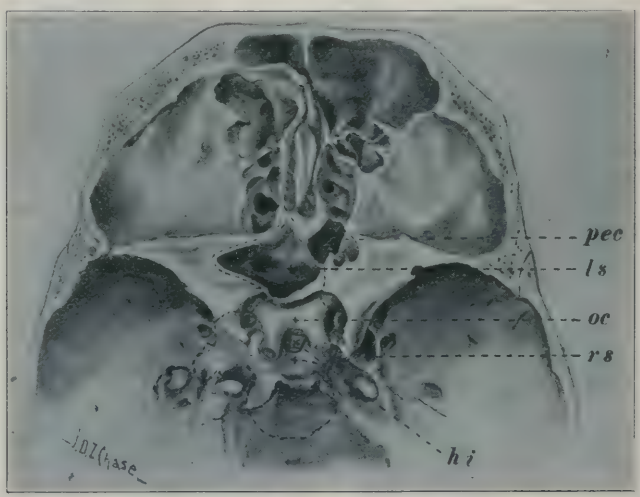

Fig. 8.—Dissection exposing the paranasal sinuses from the intracranial side. Particularly note the great asymmetry of the sphenoidal sinuses and the fact that the left sphenoidal sinus comes into topographic relationship with the left optic nerve, the optic commissure and the right optic nerve. The right sphenoidal sinus is extremely small, and there is no direct relationship to the right optic nerve. This type of specimen is not infrequently encountered. *pec,* posterior ethmoidal cell; *ls,* left sphenoidal sinus (the complete left sphenoidal sinus is indicated by dotted outline); *oc,* optic commissure; *rs,* right sphenoidal sinus; *hi,* hypophysis cerebri and infundibulum.

As stated before for the optic nerve, the asymmetry of the right and left sphenoidal sinuses in the same individual may be so great, that one or the other sinus wholly replaces its fellow as regards topographic relationship with the optic commissure. Indeed, it is not uncommon for either of the sphenoidal sinuses to project so far beyond the midsagittal plane as to establish direct topographic relations with both optic nerves and the optic commissure, the smaller sphenoidal sinus being wholly crowded away. It is, therefore, anatomically possible for a one sided sphenoidal sinus disease to involve equally and at the same time both optic nerves and the optic commissure (Fig. 8).

The frontal sinus, when of the supraorbital type and developed dorsomedially, rarely establishes intimate topographic relationships with the optic nerve in the neighborhood of the optic

bital plate of the palate bone and into the neighboring ethmoidal mass, it may come into rather intimate relationships with the optic nerve, thin bone alone intervening.

The ostium of the sphenoidal sinus is disadvantageously located for good drainage, being placed a goodly distance from the sinus floor. Indeed, in some cases, pus in the sinus would rise almost to the location of the optic foramen before it could escape from the aperture of the sinus into the nasal cavity. Tables 3 and 4 illustrate the variations in the location of the sphenoidal ostium or aperture, and the variation in the distance between the optic nerve and the ostium.

While the ethmoidal cells for the most part have gravity drainage, their ostia not infrequently are of inadequate size and disadvantageously located, so that pathologic states of the mucous membrane readily bring about physiologic closure of the apertures.

TABLE 3.—DISTANCE FROM CENTER OF OSTIUM SPHENOIDALE TO ROOF AND FLOOR OF SINUS.

Side	Distance from Center of Ostium Sphenoidale to Roof of Sinus Mm.	Distance from Center of Ostium Sphenoidale to Floor of Sinus Mm.
Right	12	17
Left	10	13
Right	12	12
Left	12	5
Right	2	3
Left	16	13
Right	2	20
Left	12	17
Right	3	6
Left	12	4
Right	15	17
Left	17	16

ing, Holmes, Knapp, Moritz, Onodi, Packard, Posey, Skillern, Sluder, White and others. Unfortunately, space does not permit a review of the literature in this connection.

Orbital cellulitis and abscess secondary to ethmoidal labyrinth disease is not difficult of comprehension when one recalls the extremely thin, indeed often defective, party walls between the orbit and the ethmoidal cells. The frontal and sphenoidal sinuses, too,

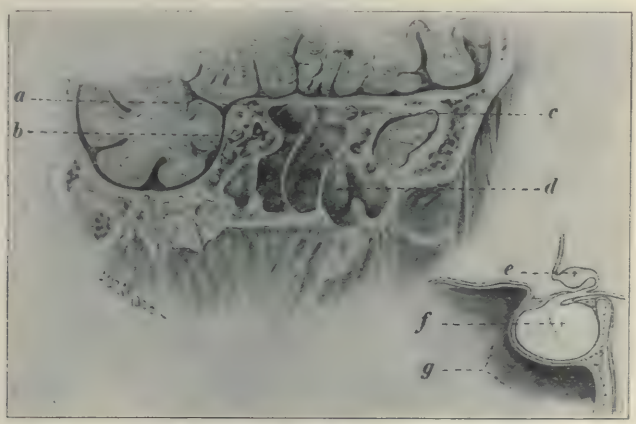

Fig. 9.—Coronal section, exposing the dorsal wall of the sphenoidal sinuses. Particularly note the optic nerves and the lateral recesses of the sphenoidal sinuses. The inset shows the relationship of the optic chiasm to the hypophysis cerebri in this specimen. This type of anatomy precludes intimate topographic interrelations of the optic commissure and the sphenoidal sinus. *a*, optic nerve; *b*, cavernous sinus and contained structures; *c*, optic nerve; *d*, sphenoidal sinus; *e*, optic commissure; *f*, hypophysis cerebri; *g*, sphenoidal sinus.

TABLE 4.—DISTANCE BETWEEN OPTIC NERVE AND OSTIUM SPHENOIDALE

Cadaver	Right Mm.	Left Mm.
A	8	12
B	9	5
C	9	11
D	15	15
E	2	2
F	4	0
G	6	0
H	12	12
I	4	4
J	2 above	1 above
K	3 above	2
L	6	13

COMMENT.

It appears established beyond peradventure that disease of the nose and paranasal sinuses not infrequently leads to various disturbances of vision; indeed, at times to blindness. The problem is not a new one: Onodi and Hanau W. Loeb, particularly, did real constructive work in establishing the topographic interrelations of the optic pathway and the paranasal sinuses. Noteworthy contributions in this subject, in the anatomicoclinical and clinical fields, are those of Bordley, Cush-

frequently have thin orbital walls. The maxillary sinus is said seldom to give rise to orbital abscess. Optic nerve inflammations may or may not result from such orbital conditions. The toxic types of optic neuritis may result from infection of any of the paranasal sinuses, and from conditions elsewhere in the body, the invasion in all probability being by way of the blood stream. Various types of intraocular conditions also result from paranasal sinus disease. Intracranial lesions may involve the visual pathway.

It is, however, not the applied anatomy of the foregoing conditions that concerns us here, but the finer anatomy underlying acute involvement of the sinus portion (vide supra) of the optic nerve and of the optic commissure in disease of the posterior ethmoidal labyrinth and the sphenoidal sinus. Onodi, Loeb, the writer in the foregoing pages and elsewhere, and others

clearly establish the very intimate gross topographic interrelationships of certain of the posterior ethmoidal cells and the sphenoidal sinus, and the visual pathway. As one would expect, many cases of optic nerve involvement secondary to posterior ethmoidal and sphenoidal disease are on record. This is in keeping with the intimate relational anatomy. However, despite the relational anatomy, postethmoidal and sphenoidal infection is common, and optic pathway involvement secondary to it apparently less so.

Fig. 10.—In this dissection note that the optic commissure is located ventral to the hypophysis cerebri and over the left sphenoidal sinus. The right sphenoidal sinus, indicated by the arrow, comes into intimate relationship with the right optic nerve, but the optic commissure and the left sphenoidal sinus are related to the left sphenoidal sinus.

Considerable obscurity in the applied anatomy now prevails, and what is needed is a more detailed study of the lymphatic drainage of the accessory nasal sinuses and the tissue spaces about the optic nerve and commissure. Indeed, the finer blood supply of the parts needs further investigation. It is my belief that herein lies the solution of some of the extensions of paranasal sinus disease to the visual pathway.

One naturally wonders why the optic nerve and commissure escape involvement in even some aggravated types of posterior ethmoidal and sphenoidal infection. Why does the optic nerve so readily become involved in some cases of posterior sinus disease? Why is the canalicular segment of the optic nerve apparently a vulnerable point in the optic pathway? Why do some cases of acute optic neuritis and impaired vision clear up so quickly following adequate drainage and treatment of posterior ethmoidal and sphenoidal infections? Why does the optic neuritis in these cases occasionally lead to optic atrophy and blindness? Is there an anatomic explanation for the peculiar changes in the visual field in these cases? Is the optic pathway involvement brought about by infecting planes of contiguous tissue or are the tissue spaces (lymph spaces) and lymphatic networks at fault? Are the toxins or infectious materials brought by the blood stream?

Some of the queries are fairly easy of interpretation, others at present lead us into the realms of hypothesis and speculation. It is obvious that variations in size, shape and type and the asymmetry of the posterior ethmoidal cells and the sphenoidal sinuses are important factors in the inconstancy of clinical manifestations.

In some cases the sinuses in question are comparatively small and the osseous walls relatively thick, or the main pneumatization may not be in the direction of the optic pathway. Involvement of the latter in such cases is less likely. Again, the merest film of bone intervenes between the mucous membrane of the sinuses and the

sheath of the optic nerve, and in case of osseous dehiscences the sinus mucosa is in direct contact with the optic sheath. Infection of the optic nerve in such cases by involvement of contiguous planes of tissue would appear inevitable. In this connection one must not forget the tissue spaces and their relation to the lymphatic capillary network of the sinus mucoperi-

Fig. 11.—Dissection of the lateral wall of the nasal cavity and the nasopharynx of a boy, aged 11 years. It is interesting to note that the optic nerve is exposed for a goodly distance to the sphenoidal sinus.

osteum, on the one hand, and to the meningeal spaces about the optic nerve, on the other. The lymphatics of bone occur in great abundance in the periosteum, and as perivascular spaces penetrate the canals of Havers and Volkmann. In the marrow, perivascular spaces are abundant. The cancellous bone between the compact strata becomes greatly reduced; indeed, at times it is wholly wanting, owing to extreme thinness of the walls of the paranasal sinuses.

Clinically, it would appear that the canalicular segment and the more apical portion of the intraorbital segment of the optic nerve are the most vulnerable of the entire pathway. From an anatomic point of view, one would expect this. These parts of the pathway are almost constantly in very intimate topographic relationship with the most dorsal of the posterior ethmoidal cells and the sphenoidal sinus. It would appear that an edema or swelling of the optic nerve would early lead to pressure on the component neurons in the canalicular segment, owing to the unyieldable osseous canal thru which this portion of the optic pathway courses. Nerve head manifestations, owing to stasis and pressure, would appear certain.

The cell bodies of the neurons in the retina may be intact, but with impairment of some of the fibers of the visual pathway there can be no central registration for such diseased parts. This probably would manifest itself in changes in the visual field. Here one thinks of unequal pressure on the several fascicles composing the optic nerve, pressure affecting the lesser blood supply of the deeper portion of the nerve, or of a selective action of toxins on individual groups of neurons composing the optic nerve. Much study here is needed. In the absence of neurilemma cells there can be no regeneration of atrophied axons within the optic pathway, this despite the fact that the cell bodies of the neurons may

be intact in the retina. Of course, the cell bodies, too, suffer changes.

The optic commissure is less frequently involved, owing in all likelihood to the underlying relational anatomy. In some cases intimate topographic relationship between the commissure and the sphenoidal sinus is precluded by the interposition of the hypophysis cerebri. Again, where infection, it is reasonable to assume either that no intimate relations between the parts exist, or, if they do exist, that drainage of the involved sinuses is adequate. Inadequate drainage would lead to great pressure on the mucosa and the contained tissue spaces and the lymphatic capillary network. Is it not reasonable to suppose that there is in these cases a damming back

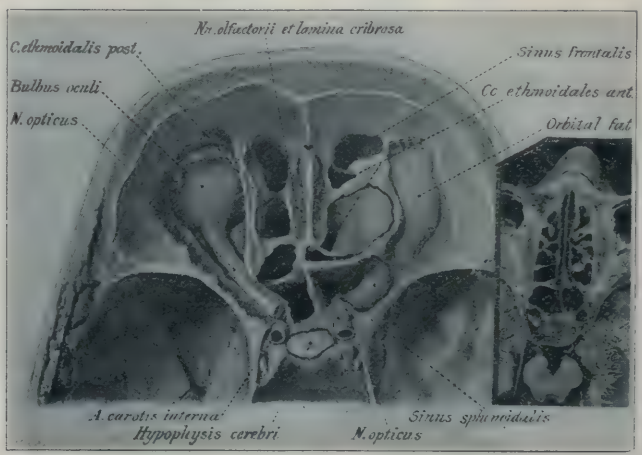

Fig. 12.—Exposure of the paranasal sinuses, orbital tissues, eyeball and optic nerves from the intracranial aspect. Particularly note the relationship of the left optic nerve to the posterior ethmoidal cells and the sphenoidal sinuses. The right optic nerve pushes the lateral wall of the sphenoidal sinus into a conspicuous moundlike relief.

more intimate relationships exist, the intervening bone may happen to be relatively thick. It is, however, very essential to recall that many sphenoidal sinuses come into the most intimate and vital relationship with the optic commissure. Sometimes a single sinus comes in contact with the right and left optic nerves and the whole optic commissure, one of the sinuses being small and wholly crowded aside.

Since some intimately related optic nerves and optic commissures escape involvement in even aggravated types of posterior ethmoidal and sphenoidal infections, and not infrequently fairly marked cases of optic neuritis and changes in the visual field rapidly yield to adequate drainage and treatment of infected posterior ethmoidal cells and sphenoidal sinuses, one cannot help believing that the tissue spaces and the lymphatic system must be the deciding factors. Where the optic pathway escapes in aggravated posterior sinus from one tissue space to another or invasion of contiguous spaces, ultimately involving the epidural and other tissue spaces about the intimately related portion of the optic pathway?

The dura mater itself is relatively rich in tissue or lymph spaces which indirectly open into the epidural and subdural spaces. Moreover, the dural tissue spaces proper are continuous with the perivascular and perineural spaces. This seemingly is the way the tissue spaces of the dura mater and epidural and subdural spaces are brought into contiguity with the lymphatic capillary networks of the nose.

The tissue spaces found between the meningeal extensions along the optic nerve are lined with endothelium. These spaces can be injected from the subdural and subarachnoidal spaces of the brain, showing their direct continuity. It has been shown that when a ligature is placed around the optic nerve and its sheath in front of the op-

tic commissure, colored fluid injected into the tissue spaces about the nerve will penetrate into the tissue clefts of the interior of the nerve as far forward as the optic disc. Moreover, the extradural or supravaginal tissue space of the optic nerve communicates ventrally with the interfascial space of Tenon, and dorsally at the apex of the orbit with the subdural space of the cranium.

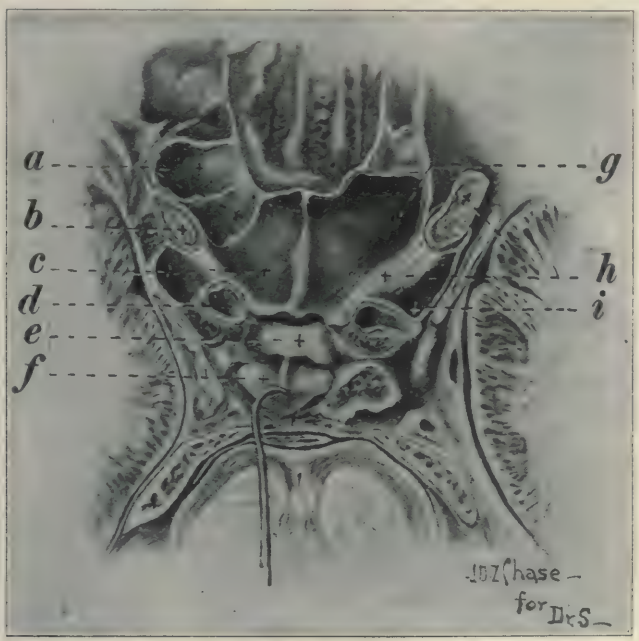

Fig. 13.—Dissection exposing the roof of the sphenoidal sinuses and the course of the optic nerves and optic commissure. The hypophysis cerebri is pulled back so as to expose the optic commissure. The merest film of bone separates the mucous membrane of the sphenoidal sinuses from the optic nerves. *a*, posterior ethmoidal cells; *b*, right optic nerve; *c*, right sphenoidal sinus; *d*, right internal carotid artery; *e*, optic commissure; *f*, hypophysis cerebri; *g*, left sphenoidal sinus; *h*, left optic nerve; *i*, lateral recess of left sphenoidal sinus.

Schwalbe has shown that injection of the subdural space results in the injection of Tenon's space.

The vascular blood system cannot be ignored in this connection: The ophthalmic artery thru its ethmoidal and aberrant branches, and the internal maxillary thru its sphenopalatine and pterygopalatine branches, have to do with the blood supply of the ethmoidal labyrinth and the sphenoidal sinus. Moreover, there is a very definite anastomosis between the terminals of the ethmoidal arteries and those of the sphenopalatine artery. The ultimate distribution to the sinuses in question is effected by capillary networks, which supply the mucoperiosteum and penetrate the osseous walls.

The venous return is accomplished by three main routes; ventrad to the fascial vein, dorsad to the sphenopalatine vein, and cranialward by way of the ethmoidal veins, which open into the superior ophthalmic vein and the superior sagittal sinus. A vein accompanies the anterior ethmoidal artery and empties into venous plexus of the olfactory tract. Since none of the branches of the ophthalmic veins have valves, blood may flow in either direction, e. g., into the cavernous sinus or into the peripheral veins with which the ophthalmic veins anastomose. In the latter connections, one would think of the ethmoidal veins connecting with the veins of the nasal cavity and certain paranasal sinuses, of the branches of origin of the facial vein, and of the large pterygoid venous plexus. Many of the veins with which the ophthalmic veins anastomose are destitute of valves.

HYPERCHOLESTERINEMIA AND ALBUMINURIC RETINITIS.

PIERRE GAUDISSART, M.D.

BRUSSELS, BELGIUM.

This investigation of the cholesterin content of the blood in cases of chronic nephritis and various ocular conditions was made in the Department of Pathology in the Philadelphia General Hospital.

Few ocular diseases have a pathogenesis so much contested, and still so unexplained as albuminuric retinitis. With no intention of reviewing the voluminous literature of that question, let us recall briefly that the production of the retinal lesions has been variously attributed to a high blood pressure; to local vascular changes; and to modifications in the blood chemistry, as by the retention of urea in the blood stream. In recent years it has become manifest, that the attention of clinicians in internal medicine has been attracted by a belief that the content of the blood in various diseases, particulary chronic nephritis, has become modified by the presence of lipoids, especially cholesterin.

The notion of the importance of cholesterin was introduced into ophthalmology by Chauffard and his disciples. They attributed the origin of gerontoxon, of xanthelasma, and, more recently, of synchisis scintillans, to a condition of hypercholesterinemia. The mechanism of the production of these lesions, as well as of those of retinitis, about which we shall speak presently, may be described somewhat as follows:

At first there is merely an increase of the cholesterin content of the blood —the stage of circulating cholesterin: and later on, cholesterin is deposited in the tissues, then in the skin of the lids producing xanthelasma, in the cornea, gerontoxon; in the vitreous body, synchisis scintillans:—the stage of deposited cholesterin.

In 1911-1912, Chauffard[3-5] reported fourteen cases of albuminuric retinitis, in which he attributed the formation of the white retinal exudates to a hypercholesterinemia. According to Chauffard, the first lesion consists of a fibrinous exudation, in which, on account of the high cholesterin content of the blood, a local deposit of cholesterin speedily follows. giving rise to the typical white spots so common in albuminuric retinitis. Hypercholesterinemia would thus be an early phenomenon of nephritis, which should decrease but not wholly disappear in proportion to the progress of the uremia and the intoxication of the blood. It is therefore in the early stages of the retinitis that the highest hypercholesterinemia ought to be found.

Achard and Feuille, Chauffard, Guy Laroche and Grigaut[4-5], in later papers, confirmed these observations, and in 1920, Chauffard, Laroche and Grigaut published twenty-eight cases of albuminuric retinitis, all of which had exhibited an increase of cholesterin and of urea, together with a heightened blood pressure.

But is not the question of the pathogenesis of albuminuric retinitis twofold? Does it not require, first, the study of the changes in the blood chemistry at the very moment of the production of the lesions, and second, the histochemical examination of the lesions? Such an examination, rather than the first postulant would be likely to give us a more definite solution, if it were not for the imperfection of our histochemical knowledge.

In 1909, previously therefore to the researches to which we have referred, Laubert and Adamück[6] stated, that the white spots of albuminuric retinitis showed the characteristic reactions of the lipoids, viz—double refraction for polarized light; staining black by osmic acid, orange by Sudan II, and pink by Nilblau (Nile blue).

In 1912, Chauffard, Laroche and Fontréault[7], after the microscopic study of a flat extended retina, from a patient who had displayed an albuminuric retinitis and hypercholesterinemia, reached the same conclusions, and in the same year, obtained identic-

al, tho less affirmative results. He was not able to prove conclusively the relative importance of the lipoid containing cells and the extracellular lipoids. "The lipoid cells," he states, "are very small and do not exist in layers thick enough to be ophthalmoscopically perceptible. The white spots of the albuminuric retinitis are of multiple origin, an origin which can not be determined by the ophthalmoscopic examination."

Mawas[9-10], 1913-1916, in a similar work, concluded in a decidedly opposite way. Four lesions, he holds, produce the ophthalmoscopic appearance of the retinitis; the first, the most frequent encountered, and the most important, is a fibrinous exudate on the outer plexiform and the outer cellular layers. Subsequently, in some cases, phagocytosis of this exudation of granular cells ensues; yet, such cells as these are also met with in degenerations of the nervous fibers. They are large and round with a small nucleus, in the protoplasm of which appear, when prepared by the special methods to which we have referred, droplets of lipoids. Yet these lipoids belong to the very nature of the cells, and are not the result of the phagocytosis of the exudation, for Mawas has never been been able to demonstrate cholesterin in the fibrinous exudation itself. Clumps of these special granular cells constitute the only white spots of lipoid origin; they ought, therefore, to be deemed a late and casual phenomenon in the course of albuminuric retinitis. His conclusion, accordingly, is in absolute contradiction with the ideas of Chauffard, who regards the deposits of cholesterin as constituting the initial and the primordial phenomenon of the retinitis. The third lesion is a detachment of the external limiting membrane, which gives rise to the ophthalmoscopic appearance of large opalescent areas.

Finally, there sometimes ensues a gangliform degeneration of the nerve fiber layer, which becomes manifest as small white patches.

The two last lesions are rare and are of less importance than the other lesions present. The study of the histologic lesions, as can be seen, has contributed but little to solve the problem.

I undertook my study with the intention of reconsidering the researches of Chauffard, from a more intimate ophthalmologic standpoint than he has implied, but especially to determine the relations existing between hypercholesterinemia and the various forms of retinal exudates; and to detect, if possible, the coincidence of the initial appearance of the white spots and the onset of an increase in the cholesterin content. My researches have given me very different results from what I had expected.

Methods: I have adopted for the determination of the cholesterin content of the blood, the colorimetric method described by V. C. Myers, and Wardell[11], in 1918. I refer the reader, inquiring for technical details, to the original paper of these authors. I will, however, briefly summarize the method.

1 cc. of blood is intimately mixed with about 4 grms. of plaster of Paris. This mixture is dried for one hour in an oven, at 90° C., and its cholesterol content is extracted by boiling chloroform. The extract obtained and a previously prepared standard chloroformic solution of cholesterin are then subjected to the Liebermann-Burchard staining reaction; that is to say, when acetic anhydrid and sulfuric acid are combined in the presence of cholesterin, a blue-green color is produced, the depth of the color depending on the concentration of the solution. These two solutions are put in a colorimeter and their comparative cholesterol content is determined.

I adopted this method because of its simplicity and clinical accuracy. Myers and Wardell submitted their method to comparative tests with the Windhaus, and the digitonin-gravimetric methods, and their results were in full accord.

I frequently reassured myself of the completeness of the extraction of the cholesterin by submitting the last chloroform extraction to the coloring

reaction, to verify that it remained colorless.

I employed total blood, kept in oxalated tubes. The amount of cholesterin in total blood is slightly less than that of serum; according to Myers, the content varies between 120 and 170 mgrs. per 100 cc. In order to verify this statement, and also to determine the value of the personal element in this research, I undertook a series of tests on subjects suffering from diseases in which the cholesterin is not disturbed. Table 1 shows the lowest content at 120, the highest, 170. I, therefore, am justified in considering every blood in which the content is above 170, to be hypercholesterinemic.

Table I

Nephritis with hypercholesterinemia, but without retinitis.

Clinical diagnosis	Blood pressure systole	Blood pressure diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Chronic nephritis	150	90	42	220
2. Chronic nephritis	130	70	27	420
3. Chronic nephritis	115	75	24	292
4. Chronic nephritis	210	110	103	192
5. Chronic nephritis	140	80	183	190
6. Chronic nephritis	125	20	75	180
7. Chronic nephritis	180	90	120	230
8. Chronic nephritis	230	140	94	190

The urea of the total blood was measured with the urease method. The numbers, in the tables, give the content in urea, not in nitrogen.

I would add I did not select my cases of retinitis. The studies were made on the patients as they fell under observation in the clinics and hospitals of Philadelphia.

Results. I have divided the cases into sections which are arranged in three tables. Table 2 includes nephritis with hypercholesterinemia without retinitis. Table 3, albuminuric retinitis without cholesterinemia; and Table 4, those with hypercholesterinemia.

Table II

Controls

Clinical diagnosis	Cholesterol mgr. p. 100 c.c.
1. Central choroiditis	140
2. Thrombosis branch central vein	155
3. Phlyctenular Keratoconjunctivitis	120
4. Atrophy papillomacular bundle	165
5. Chronic urethritis	150
6. Chronic urethritis	150
7. Chronic urethritis	145
8. Chronic urethritis	170
9. Chronic urethritis	155
10. Luetic chancre	160

TABLE III

Albuminuric retinitis without cholesterinemia.

Ophthalmoscopic examination.	Blood tension systole	Blood tension diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Edema of disc and retina; hemorrhages; dirty greyish exudates	215	165	56	150
2. Retinal edema; hemorrhages; edematous exudates	260	120	62	130
3. Edema of disc and retina; white, yellowish exudates; hemorrhages	290	135	47	125
4. Neuroretinitis; hemorrhages; white exudates; partial macular star shaped figures	235	140	46	130
5. R. Obstruction central artery; L. Edema and choked disc; white exudates; hemorrhages; star shaped macular figures	Unavailable		94	140
6. Edema retina and disc; small hemorrhages; punctate, grey exudates; yellowish and white exudates	150	120	73	140
7. Small white exudates surrounding disc	200	130	Unavailable	115
8. Old retinitis; pronounced arteriosclerosis; hemorrhages; dirty greyish exudates	160	80	80	160
9. Edema of disc and retina; small hemorrhages; white yellowish exudates; edematous exudates	205	110	77	150
10. Edema of retina and disc; hemorrhages; white yellowish exudates	200	110	47	160
11. Edema of disc and retina; hemorrhages; small yellowish exudates	170	115	280	145

TABLE IV

Albuminuric retinitis with hypercholesterinemia.

Ophthalmoscopic examination.	Blood pressure systole	Blood pressure diastole	Urea mgr. 100 c.c.	Cholesterol mgr. 100 c.c.
1. Edema of retina and disc; yellowish exudates; vascular lesions	220	145	88	232
2. Edema retina; hemorrhages; white exudates	260	200	68	240
3. Edema of retina and disc; hemorrhages; white exudates	260	120	24	175
4. Edema of retina and disc; hemorrhages; white exudates; starshape macular figures	270	120	193	180
5. Numerous hemorrhages; white and yellow exudates; synchisis scintillans	205	140	75	220
6. Edema of disc and retina; white and yellowish exudates surrounding retina	170	85	60	220
7. Neuroretinitis (old); yellow exudates	260	200	20	180

We may consider the possible relations between cholesterinemia and albuminuric retinitis according to the following hypotheses:

I. Cholesterin as the direct cause of the retinitis; when in excess in the blood it produces lipoid deposits in the fibrinous retinal exudates and gives rise to the socalled white spots of albuminuric retinitis.

II. The association of retinitis with hypercholesterinemia arises without hypercholesterinemia as the cause of the retinitis, for both are manifestations of the same disease, the result of a common pathologic disturbance. The presence of cholesterin, therefore, would be only a concomitant of the retinitis. And III. There is no connection between the two conditions.

An inspection of Tables III and IV will show that in 18 cases of retinitis, 11 did not display hypercholesterinemia.

In Table III, 3, 6, 7, 8, 10, relate to early cases of retinitis, disclosed by the clinical histories and the ophthalmoscopic examinations. Altho these displayed typical white spots, all of the patients had normal cholesterinemia. Case 6 was particularly interesting, because we were able to follow very accurately the course of the disease. When first examined the fundi presented edema of the discs and of the surrounding parts, together with a few small patches of exudate, some of which were grey and could hardly be differentiated from the fundus; other patches were more clear, while some were bright white. A few weeks later, one distinctly larger and brighter white exudate was seen to have been formed near the margin of the disc. Despite this formation of exudate, the cholesterin content of the blood remained normal—140.

Case 10 exhibited the same characteristics. At the ophthalmoscopic examination, a beginning neuroretinitis without exudates was discovered. Four weeks later we saw a yellowish white exudate along the disc margin. At the time of each examination the cholesterin content was normal—160.

Notwithstanding the presence of active retinitis, in two of which there were displayed macular, star shaped figures, none of the other cases of this table showed hypercholesterinemia. It would seem to me, therefore, very difficult to ascribe to cholesterin the primary and essential part in the genesis of the exudate in albuminuric retinitis. Because I did not see constantly present any one particular form, I deem it erroneous to speak of any single type of exudate as characteristic of albuminuric retinitis. Between the dirty greyish edematous spots and the bright white exudate, we found every intermediate stage. Furthermore, ophthalmoscopic appearances regarded as characteristic of albuminuric, or, of diabetic retinitis, such as the star shape figures, have been found in various other diseases, as in erysipelas and syphilis, or in the course of choked disc, papilledema. It is more than likely that the retina reacts similarly to the influences of various diverse pathologic excitations, just as a variety of infections can produce a pseudomembranous conjunctivitis.

We have to consider the hypothesis in which hypercholesterinemia appears without being the cause of retinitis. This, in my opinion, is very unlikely, because of 18 cases of retinitis, only 7 showed hypercholesterinemia, altho there was manifested high blood pressure as well as the presence of uremia.

In addition, Table II shows, that in so small a total as 16, 8 cases of chronic nephritis without retinitis were found, yet in these the amount of cholesterin was above the normal, sometimes very greatly. It would have been possible for me to have observed a much larger number of individuals, but I deem the group here considered to be sufficient to demonstrate that hypercholesterinemia in chronic nephritis can exist without retinitis.

I accordingly am compelled to accept the third hypothesis. Therefore, inasmuch as more than half of my cases of albuminuric retinitis did not have hypercholesterinemia, and as those which showed it had also either uremia or a

high blood pressure, if not both; and as a number of chronic cases with hypercholesterinemia did not have retinitis, I believe that there is no definite relation between hypercholesterinemia and albuminuric retinitis.

In this discussion it has been my intention to consider the pathogenesis of albuminuric retinitis from other standpoints. It may be apropos to remark upon certain interesting coincidences which I observed. All of the cases of retinitis showed either high blood pressure or an increase of the blood urea; however, too much importance must not be attributed to the number of cases because of the possibility of the influence likely to be exercised by rest in bed, diet, etc.

Certain cases with normal or subnormal blood pressure were in a state of disturbed cardiac compensation and had exhibited increased pressure at some time in the course of the disease. I was much interested in observing that out of 18 cases of retinitis, 13 had high blood tension (more than 200 mm. of Hg.); and among 8 cases of nephritis, without retinitis, only 2 showed a blood pressure above normal. Five had more or less pronounced uremia, and of the 18 cases of retinitis, 12 had more than 50 mgrs. of urea per 100 cc.

Conclusions. 1. There seems to be no relation between hypercholesterinemia and the formation of the exudates of albuminuric retinitis.

2. No coincidence seems to exist between the presence of hypercholesterinemia and albuminuric retinitis.

3. Albuminuric retinitis is always accompanied by either high blood pressure or by uremia, or by both.

Before closing this report, I wish to thank Dr. Edward B. Krumbhaar, Chief of the Department of Pathology, of the Philadelphia General Hospital, for the generous hospitality that he gave me in his superb laboratories. The advice of Dr. W. H. Stoner, of the laboratory of Biochemistry, of the same department, was most valuable for the technical part of these researches. And, I wish to express my sincere appreciation to Dr. Burton Chance of Philadelphia, for his kindness in revising the translation of this paper.

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VARIOLOUS INFLAMMATION OF THE CORNEA.

G. Herbert Burnham, M.D., F.R.C.S., Edin.

TORONTO, CANADA.

This paper reports a case followed by very satisfactory clearing of the cornea under the treatment including mercury, iodids and pilocarpin.

In June 1919, a young man, aged 33 years, was referred to me by Dr. McKay of Oshawa, for his right eye, which had become inflamed during an attack of smallpox two months ago. The left eye was unaffected. There was a large dense infiltration of the cornea, occupying the outer half and so much of the inner, that I could just see enough of the iris at the extreme inner edge of the cornea, to make out that the pupil was apparently fully dilated in this direction with the atropin, which had been used prior to seeing me. The vision was light perception only, except in one part of the field, where large objects could just be made out.

There was, tho the infiltration was apparently free from any active inflammation, an irritable state and photophobia, for which I could not satisfactorily account.

I decided to use "The Combined Treatment" without delay. The first series is always twenty hypodermic injections of pilocarpin, given daily so as to get the system under the full influence. The subsequent series are each ten injections in number, and these are given at intervals of five, six, or seven weeks, so as to keep up the full effect of the drug. If the case is very urgent, the interval is four weeks, and sometimes the first series is thirty in number.

During the series of injections I give internally, twice daily, mercury and the iodid of soda, if the patient can bear them, as sometimes they are not borne. But between the series, the medicine is always given thrice daily. The strength of the injection used in this case varied from gr. 1/8 to gr. 1/3. The first dose may even be gr. 1/12 so as to feel the general system as to any peculiarities it may have. If any dose seems to cause too much reaction, a smaller one may then be given.

This so called excessive reaction seems to be due to the inability of one or more of the organs of the body, for example the liver, to bear the sudden call upon it to decidedly increased functional activity, and hence vomiting and sometimes distress. A little later in the same series, a larger dose gives rise to no such symptoms. This remark applies to the other organs, the heart included. A sharp pain or cramps of short duration, and even slight shivering, may occur. These are entirely due to the heightened functional activity, are noninflammatory, and harmless.

The use of the treatment is often accompanied with no disturbance, whatsoever. The maximum effect must be kept up, and this can be done without any danger or even much inconvenience, if one is accustomed to the administration of the drug. The muriat of pilocarpin is more effective, and is now used by me to the exclusion of nitrat. In this case I had given as much as gr. 1/3; but not often, as the action thru the nervous system showed that it was advisable not to do so.

He returned again in August to receive a series of ten injections. I examined the eye carefully, as I always do before beginning a series. There was a decided clearing of the infiltration, but I could see there three fuzzy white spots, evidently the center of a certain active condition, and the cause of the irritation, mentioned in the beginning.

My patient again appeared in October, just prior to another series of ten injections. A marked improvement had occurred. The vision was 6/18.

At the end of November, when he again came up for another series of ten injections, I examined him and found the condition as follows: Without

mydriatic the vision was R. +1.00 cyl., 6/9; L. +1.00 cyl., 6/6 easily. With a mydriatic, vision was R. +0.25 sp.⌒ +1.00 cyl.=6/6 slowly; L. +0.25 sp. ⌒+1.00 cyl.=6/6. Glasses were ordered.

In January 1920, he again came to see me, that is about seven weeks after the last series. With undilated pupil the vision was with glasses R.=6/9.

As the eye looked so well and the slight corneal haze, tho still present, was not visible to an ordinary onlooker, he decided to cease the treatment. I remarked, that if another series of ten injections were given, the haze would disappear, and the vision be as good as that of the other eye; that is normal. His general health was excellent, and he had gained ten pounds in weight.

January 1921—this is the first visit since January 1920. There is still a slight haze of the cornea, and the eye is quiet. The vision is R. +1.50 cyl. =6/9 and a few letters of 6/6; L. vision as before.

I now reminded him of my former advice, and that had he but taken it the vision would now have been normal. I have brought this case to your notice as corneal inflammation, due to smallpox, is now so rarely seen.

Speaking in a general way in regard to corneal ulceration and corneal inflammation of a severe type, which type alone tests the respective merits and the superiority of any form of treatment, I can affirm, without hesitation, that the "Combined Treatment" has been, in my hands, very successful, and is to be relied upon. It not only heals, but also clears the corneal tissues involved so that good vision is given. Even when causing the greatest effect, its action is always physiologic, and therefore unattended with any ill effects, either in regard to the eye or the system generally, that is, doing away with the fear of any injurious action upon the eye during its use. This is a statement, a contention, which my long experience has markedly verified.

My patients also show in addition to the great improvement of the local disease (very many times a cure) a greatly bettered general condition, so often evidenced by that sure sign, viz., a cleared and healthier look to the skin, or as a lay person would express it, a better complexion.

The superactivity of the nerve centers of the whole nervous system, but especially of the diseased tissues, produced by the use of the "Combined Treatment," has always been the hypothesis upon which I have reasoned and worked. This hyperactivity causes such a sustained and decided increase of the physiologic circulation of the affected tissues, that the germs of the disease are overwhelmed and destroyed, and thus there are brought about a decidedly improved condition and often an apparently normal state.

This is the manner of action of the so called "spontaneous" cure. The term physiologic circulation is one which includes all the means used in the economy of the body to nourish any normal tissue. The "Combined Treatment," as well as having the power of exciting this hyperactivity of the physiologic circulation, has also this naturally associated effect, in that it seems never to cause other than an activity, which gives rise to no abnormal state of the tissues. In other words this superactivity is always a heightened normal condition, tending towards what may be termed almost perfect health.

At times, while the eye affection is being treated by this remedy, this treatment has also most beneficially acted upon a long standing and obstinate skin disease, as eczema. It is a legitimate outcome and a support of my hypothesis with respect to the "Combined Treatment."

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NOTES, CASES AND INSTRUMENTS

SYMMETRIC CYSTIC ENLARGEMENT OF THE LACRIMAL GLANDS DUE TO SYPHILIS.

H. W. Cowper, M.D., F.A.C.S.

BUFFALO, N. Y.

An Italian, age about 50, entered the General Hospital because of the tumors shown in the accompanying photograph. That on the left side began eighteen months previously. On the right side about nine months.

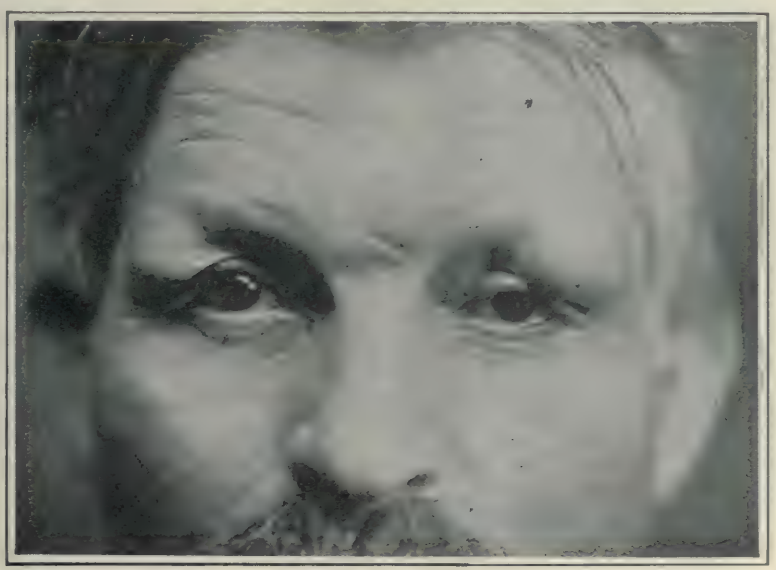


Fig. 1. Enlargement of lacrimal glands due to syphilis. Cowper's case.

There had been a steady slow increase in size. No pain or other discomfort had been experienced. The tumors were cystic and passed under the orbital ridge. There was no tenderness or redness. None of the neighboring lymphatics was enlarged. He came to the hospital for operation and several who saw him thought operation the proper procedure. The Wassermann was positive. Three or four weeks after one injection of arsphenamin, the swellings had entirely disappeared.

Such cases are seen very infrequently. This one is therefore worth recording.

PHYSIOLOGIC HYALOID ARTERY REMNANTS.

Robert Von Der Heydt, M. D.

CHICAGO, ILL.

Read before the Chicago Ophthalmological Society, October 24, 1921.

When remnants of the hyaloid artery are seen, by focal illumination with the ophthalmoscope, they are considered persistent in the sense that nature has not fully completed their absorption in the normal manner. Very decided cases of this kind, as is well known, are often associated with various other congenital ocular malformations.

The hyaloid artery is carried forward to its expansion on the posterior capsular surface of the lens in the third month of fetal life. At birth, according to Parsons, the whole of the vitreous lental system of blood vessels has become absorbed and has disappeared. That this is not quite true has now been disclosed by the Gullstrand slit lamp in conjunction with the binocular microscope, when observing the living eye.

A very large percentage of normal eyes show a long spiral formed vessel remnant, attached somewhat nasally and downward from the lens center on the posterior capsule. This physiologic remnant hangs downward, in the now definitely discernible, optically empty, posterior lental space, first described by Berger. This space, as may be easily observed is quite a large and

Fig. 1. Physiologic hyaloid remnants. Seen with corneal microscope by slit lamp illumination.

deep one, not as is mentioned by Salzmann, a "capillary slit." On motion of the eyeball the lower free end of the spiral remnant is seen to gyrate or swing freely. At times the spiral elongates to quite a degree during this movement.

That we are dealing with the physiologically natural disposition of this remnant, and not with an occasionally pathologic persistence of this vessel structure, is now certain. First of all, there is found a uniformity in thickness. Secondly, the great number of instances where these structures were found in normal eyes absolutely excludes their presence as being a chance finding. I have seen at least fifty instances in youthful individuals, where the pupils were dilated incidental to refraction, in my office practice within the last year.

There can be no doubt that this delicate structure is destroyed in the process of fixation and hardening, incidental to the preparation of specimens for histologic examination. Other structures that do not withstand this process of preparation have been observed in great numbers, by examination of the living eye with the slit lamp under high magnification. Among these it is interesting to mention the various types of vacuole formation within the lens structure and subcapsular in location, and the physiologic and pathologic dew like changes in the cornea. We commonly find star shaped pigmented remnants of the pupillary membrane on the anterior capsule, and exceedingly often delicate cotton and spider web like remnants, attached to the iris and floating with free ends in the aqueous. These latter are found in about one-third of all eyes, tho not as frequently in old age. I also wish to mention in this connection the great variety of other vascular remnants, hitherto unrecognized, which are now disclosed on all posterior capsules by the slit lamp.

Why do we find these remains of the hyaloid artery in some eyes and not in others? Why, when found, are they always bilateral?

There are several factors which I think predispose to their finding final lodgment in the postlental space. First we must assume that in order to make their appearance within this space, a comparatively central or more posterior severance of this vessel must occur. This is proven for when found they are all quite long.

It seems quite likely that during the growth of the eyeball the vessel remnant is drawn taut. At the time of rupture, for this reason, it is projected toward the lens. This tension seemingly also accounts for the spiral and curled up form always assumed by the hyaloid artery remnant.

If the point of separation is anterior and there be space present within the posterior canal, the longer end may for the same reason normally gravitate toward the nerve head attachment; where I anticipate it may be found in many cases, were we to succeed in better observation and penetration by focal light into this area. It must however be remembered that in this area the increased reflection from the retina and luminous nerve head may be sufficient to obscure this delicate structure. In the anterior situation behind the lens, it is only visible when under direct focal illumination.

I also presume a patency of the canal of Cloquet is necessary for a successful gravitation, the normally variable fluidity of the vitreous within certain limitations would not be a factor favoring its appearance or absence, except that possibly its swaying motion may aid dislodgment.

In order to expect to find the artery remnant posterior to the lens, it therefore is necessary that a somewhat posterior separation occur and the canal be open and free to admit of its gravitation. I am finally of the opinion that a certain position of the fetal head in utero, which favors its gravitation toward the postlental space, at the time of the splitting of this vessel remnant, is a third and important factor which may contribute toward the creation of this new and interesting histologic finding.

DETERMINING THE MUSCLE POWER.

Otto Wipper, M.D.

CHICAGO, ILL.

As yet no method for testing the power of the extrinsic muscles has been accepted as a standard.

My suggestion would be to discard the prism test, in which the muscle power is measured by the highest prism with which the patient can overcome diplopia.

I would advocate a method that more or less amounts to taking the field of fixation. Instead of convergence and divergence the terms adduction, abduction, etc., should be employed.

If reference is made to the power of convergence, it should be expressed in meter angles.

The power of divergence, as determined by prisms, is an entirely negative and abnormal matter, and must be considered worthless; we simply cause a disturbance in the associate movements of convergence.

The only normal divergence consists in the return from convergence to the position of rest, the slight angle gamma divergence also being a normal condition.

The test for the vertical excursions is equally worthless when prisms are used, for here again we are trying to determine something that has no relation to a normal function, by disturbing the associate movements of parallelism.

For the determination of the power of convergence the prisms are less objectionable, because we are at least dealing with a function for which the eyes are adapted, but it is by no means a satisfactory method. A child, about ten years of age, having a high amplitude of accommodation and a somewhat corresponding convergence, will naturally converge the most; yet, when adjusted for distance the child will overcome less prism than the adult; while the adult's accommodation has gone down, his faculties of fusion and observation are more developed, and so is the muscle power.

When the refractive normal eyes are fixed for distance, the convergence as well as the accommodation are at rest; there will be a slight divergence due to the angle gamma. The binocular movements, in general, are divided into the associate movements of convergence and the associate movements of parallelism. To a greater extent both these movements are again associated.

If we adopt a method similar to the one used in taking the field of fixation, I think that the perimeter would make

a suitable apparatus; the eye to be tested should be placed in the center and its fellow be covered.

One might infer that this could be accepted for measuring the adduction, tho not for the other excursions, because accommodation and convergence are then stimulated. But we all have a perimeter and our main object in view is to establish a standard. On the other hand, it is rather difficult to obtain the required diagrams at six meter distance; I am sure that the faults of such a method would be little as compared to the ones of the prism test.

The prism test for heterophoria is ideal, and nobody considers the system of recording the phoria wrong, for we know that five degrees for distance or near means that it takes a five prism to bring the images in line, altho the actual phoria is only about two and one-half degrees, the angle of deviation being half the angle of refraction; the method is simply standardized and it is satisfactory.

Whatever method is adopted, let us stop trying to determine muscle functions which bear no relation to the normal. There is a marked difference between abduction and divergence; in normal binocular vision, the pupillary distance does not increase from that of the state of rest, nor does the pupilliary line change as brought out by placing a prism base up or down.

SUBJECTIVE OCULAR EXPERIENCES.

EDWARD J. BROWN, M.D.

MINNEAPOLIS, MINN.

Some forty years ago, on a cold winter night, while bridling my horse in a dark stable, my spectacles were knocked off and lost. My drive home was ten miles, and the following day my eyes became painful and for some days I suffered with a sharp conjunctivitis. To ease my discomfort several doses of deodorized tinctur of opium were taken, with the result that I lay for hours with a constant panorama of the most delightful kaleidoscopic colors passing before my closed eyes. This experience gave me a suggestion of the seductive dangers of the opium habit which influenced my whole professional life, with the result that no habitue has ever been able to charge me with responsibility for his misfortune.

In the summer of 1919, as a result of a cold morning ride with insufficient protection, I had a severe colon bacillus cystitis and ascending pyelitis, with a white blood count of 24,000, freedom from pain, but a weariness that was more distressing than pain. Vision was very dim but my friend, Dr. Charles Nelson Spratt, could find no objective indications of involvement of either retina or optic nerve. For two weeks or more, my waking hours were largely spent in the contemplation of the most wonderful visions of kaleidoscopic colors, geometric forms and one particular image which impressed me as being the person of Genghis Khan. This image included that of a magnificent charger, clad in armor, the feet stamping, the jaws clamping the bits and the eyes flashing.

A few days since on waking in the morning after a good night's rest, following a rather rich supper, I turned quickly from my left side to the right, and on opening my eyes found the windows and objects in the room rapidly passing to the left. This was partly relieved by turning back to the left and closing the eyes. A soap enema, a late breakfast of coffee and toast, and the trouble disappeared.

As I was writing this, an old friend, himself for some years an opium habitue, made such by the unwise administration of hypodermics by a physician for hemoptysis, and with a large experience in the treatment of habitues, came in and told me that the kaleidoscopic images and the beautiful dreams of De Quincy are never experienced except with the small and early doses.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

November 21, 1921.

Dr. Ephraim K. Findlay, President.

Operation for Drawn up Pupil.

Dr. William A. Fisher showed results of lowering the pupil by the Smith method. After a capsulotomy operation, the pupil was drawn up into the scar tissue which prevented the patient from seeing. There was no reaction following this operation.

Leontiasis Ossei.

Dr. George F. Suker presented two men, in the sixties, showing changes of leontiasis in the cranial bones, involving the orbits (photographs and X-ray plates shown), and implicating the optic nerves, producing a choked disc with the secondary atrophy in three eyes. In both cases a divergent strabismus resulted from the encroachment in the orbit by spongy bone along the inner walls, characteristic of leontiasis. In addition there was a pronounced proptosis of the two eyes. Upon a radical removal of this spongy bone, the eyeballs receded, the divergence practically disappeared and also the choked disc, but necessarily not the atrophy. Roentgenograms of other parts of the skeleton showed but a moderate leontiasis of one tibia and fibula in each patient. One patient was still living, the other died because of the excessive process involving the sphenoid in the region of the sella.

Patent Hyaloid Artery.

Dr. Suker presented a patient in whose left eye was such a vessel with fimbriated terminal convolutions, accompanied by minute hemorrhages into the vitreous on various occasions. Vision in the eye was normal when no hemorrhages were present. These occurred after violent or strenuous physical exertion. Blood pressure was normal; no tuberculosis; no syphilis present. Patient, a dentist, 38 years of age.

A Migrain Patient; Serous Meningitis.

Dr. Suker stated this patient had a serous meningitis (Quincke's type) 14 months ago accompanied by a marked bilateral choked disc. Vision in each eye now with low myopic astigmic correction 20/16. Fields for form and color concentrically contracted. At present he showed moderate secondary optic atrophy in each eye. He had a return of the serous meningitis with the reappearance of the choked discs, and after convalescence vision again was normal and fields the same as after the first attack. Being a migrain patient, with marked gastric disturbance, and these choked discs, it was thought by several, who had not recognized the Quincke's type of serous meningitis, that he had a brain tumor. No focal brain tumor symptoms could be elicited, but the classic characteristics of a Quincke's meningitis were very pronounced. The patient was an ex-soldier of exemplary habits, no lues, but had arrested pulmonary tuberculosis.

Pterygium Surgery.

Dr. Michael Goldenburg read a paper on this subject, which will be published in full in this Journal.

Discussion. Dr. Clark W. Hawley said that for something like thirty years he had seen a good many of these cases operated on by what was called the McReynolds' method. This was a misnomer. McReynolds simply made the operation popular. It was an old French operation. He had never seen an extensive case of pterygium that was treated by that operation where the cosmetic effect was good, for the reason that one left a large corneal scar and Nature would cover this rapidly by an extension of the epithelial layer of the conjunctiva

over the scar. If one took a pterygium where it extended to the center of the cornea and desired an absolutely clear cornea, it was necessary to do transplantation with Thiersch grafts, the object being to get some bridge between the pterygium and the scar on the cornea. The graft should be the thinnest possible piece of skin which might come from the mastoid if free from hair.

Dr. Goldenburg, in closing, said he was not familiar with the procedure described by Dr. Hawley. It had not been his good fortune to do any kind of surgery on the cornea where he destroyed Bowman's membrane or the cornea proper without leaving scar tissue.

The procedure he had presented was very simple. Its only advantage over the McReynolds' operation was that it removed the foreign body in the lower culdesac, brought it outside, and the eye showed hardly any reaction. After six months or a year, one could hardly tell where the eye had been operated on.

Cataract Operations Performed by Colonel Smith.

Dr. Ephraim K. Findlay stated that on the 28th of May, 1921, Lieut.-Col. Smith of Amritsar, India, operated at the Illinois Charitable Eye and Ear Infirmary on 13 cases of senile cataract, performing bilateral operations on 2 cases, making in all 15 cataract extractions. The average age of the patients was 62 1/2 years, the oldest being 81, and the youngest 43 years. All cases had good light perception and projection with clean laboratory records, except a few isolated colonies of staphylococci from the conjunctival sac of 3 of the patients.

The preparation and after treatment followed as closely as possible the directions given by Colonel Smith. The intracapsular extraction was performed in all cases except one, where the capsule ruptured before delivery. In one case only was there loss of vitreous at the time of extraction, and that in an uncontrollable patient who squeezed violently during the operation.

Four of the cases resulted in total failures from the following causes:

Case 1 had a vomiting spell after a fit of coughing the day after operation, with choroidal hemorrhage and expulsion of the vitreous and total loss of sight.

Case 2. Patient squeezed during the operation. Vitreous was lost and a severe iridocyclitis followed, with iris drawn up and the pupil occluded, so that vision was reduced to shadows.

Case 3. Patient tore the bandages off the third day and in the after treatment was difficult to control. A severe iridocyclitis followed, resulting in blindness.

Case 4. Patient had iridocyclitis; pupil was drawn up to the wound. Fine floating bodies were found in the vitreous and vision was reduced to 20/150, which no lens would improve.

The other cases after refraction gave the following visual results: One 20/20; four 20/25; one 20/40; three 20/50; two 20/65.

In percentage this would read:

Good results 20/30 or better..33.3%
Fair results 20/40 to 20/50...26.6%
Vision of 20/65.....13.3%
Failure 26.6%

Eliminating the first four cases, in the remaining 11, 6 had iridocyclitis of varying degrees of severity, with incarceration of the pillars of the iris in the wound, making a percentage of 54.5. The length of time in the hospital after the operation varied greatly, and some of the cases were retained for an operation on the second eye. Some were retained long enough so that satisfactory refraction could be made and the reports completed, as many of the patients when dismissed never returned. The average convalescing period from the other methods of operation was certainly not lessened.

In summing up as far as possible from such a limited number of cases, no definite conclusions could be drawn. The results did not show an improvement in visual result over capsular operations. The inflamma-

tory reaction was as great, if not greater, as there was more trauma.

The cosmetic result from such a large iridectomy was far from satisfactory. The claim that when the lens was removed in the capsule there was less danger of iridocyclitis had not been proven in these cases, as 54.5 per cent of iridocyclitis was a large per centage. Altho these operations were performed by a skilled master in the technic of intracapsular extractions, the results had not proven as satisfactory as the older methods of operations.

Dr. W. A. Fisher stated that on May 26, 1921, at the Chicago Eye and Ear Hospital, Col. Smith performed 16 intracapsular cataract operations on 15 patients, one of them having both eyes operated upon. The oldest patient was 85, youngest 47, and the average age 65. The longest time in the hospital was 25 days, shortest time 10 days, and the average time 14 1/2 days.

The visual results of 16 cataract operations performed by any method would not be considered a sufficient number to recommend or condemn the method. Smith was fortunate in some respects and unfortunate in others. Fortunate in having only one case with poor vision due to fundus lesion. Unfortunate in having a case of hemorrhage of the choroid, especially when it occurred only once in about 250 operations.

The visual results reported were from records received from the doctors who referred the cases, and were made about six weeks after the operations.

In figuring the above averages, Cases 15 and 16 were purposely omitted.

Discussion. Dr. Thomas Faith said as there was such a wide discrepancy between the report of Dr. Fisher and the report of Dr. Findlay, it seemed hardly fair to the operator or to the operation to go any further without investigating the histories and records of these cases.

Dr. William L. Noble. In considering the 15 intracapsular cataract operations recently performed by Dr. Smith, of India, at the Illinois Charitable Eye and Ear Infirmary, there were some things quite definitely established. First, the trauma produced on the eye was far in excess of that produced by the well established procedure for the removal of cataract as practiced on the continent, in England and America. This trauma was responsible for the large amount of iridocyclitis which followed this group of operations. Second, there was much more danger of loss of vitreous in the Smith extraction than there was in the regular standard extraction for cataract. Third, the removal of the support of the vitreous by the posterior capsule introduced another element of danger which was not present in the regular standard extraction for cataract.

An honest ophthalmic surgeon would not allow his patients to take a single chance that they did not have to take when operating for the removal of cataract. He was convinced that no man could do this operation on a patient without subjecting the patient

	Age.	Vision.	In Hospital.	Complications.
1. O. S. J.	56	R. E. 20/10	15 days	None.
2. L. A.	78	L. E. 20/15	19 days	None.
3. J. C. Y.	78	L. E. 20/15	19 days	None.
4. D. H. M.	64	R. E. 20/20	17 days	None.
5. E. E. C.	51	R. E. 20/20	11 days	None.
6. A. S.	63	L. E. 20/20	25 days	Vitreous loss; iris prolapse.
7. Dr. E. M.	56	L. E. 20/20	12 days	None.
8. J. W.	47	L. E. 20/20	16 days	None.
9. W. T. H.	65	L. E. 20/20	13 days	None.
10. L. A.	78	R. E. 20/25	19 days	None.
11. Mrs. M. W.	85	R. E. 20/30	17 days	None.
12. Mrs. O.	69	L. E. 20/40	14 days	Vitreous loss; iris prolapse.
13. M. B. N.	58	L. E. 20/50	10 days	Ruptured and retained capsule; iritis.
14. N. S.	80	L. E. 20/60	14 days	Ruptured and retained capsule; iritis; drawn up pupil; lowered, leaving clear fundus, macular degeneration.
15. E. J. P.	71	R. E. 0	10 days	Temporary insanity; iridocyclitis and occluded pupil. May make artificial pupil.
16. H. E. B.	45	R. E. 0	3 days	Hemorrhage from choroid on table.

to a very increased danger of an unfavorable result.

It must be remembered that this group of cases at the Eye and Ear Infirmary were selected and approved by Smith for operation. The whole group of cases was therefore much freer from those complications which would be found in the average of patients applying at that institution for the removal of cataracts.

Dr. Wiliam H. Wider stated: We knew that iritis and iridocyclitis frequently followed cataract extraction in the hands of any operator, however, skillfully performed. The degree of iridocyclitis varied in different cases Those who had had much experience in cataract work would agree that there might come a period about the sixth or seventh day after the operation, when the eye that seemed to have been healing normally without much sign of reaction, suddenly flared up and exhibited signs of iridocyclitis, the cause of which was not always determinable. In such cases, many operators, following the suggestions of Gifford, gave with great advantage to the patient, salicylic acid in some form. It would be manifestly unfair in such cases to charge this against the method the operator had used, unless it was clear that some infection had been introduced or the eye had suffered from unnecessary traumatism.

Probably more trauma to the eye was caused by the intracapsular method, and especially so in the hands of one who had not had the opportunity of acquiring the skill necessary to do the operation, such as Dr. Smith had, and consequently there would be more injury to the eye, more accidents, such as vitreous loss and more iridocyclitis. We ought to get as large statistics as we could to throw light on these phases of the subject. Vision did not appeal to him so much in settling the value of the method, because from the very nature of the case it might not be possible to get perfect vision. The tests of the eye before the operation might have shown excellent perception and projection and yet after removal of the cataract, the ophthalmoscope might reveal a condition of the fundus, such as posterior choroiditis or a hazy vitreous that would preclude good vision, even if the operation had been perfect in every respect. One need not necessarily pride himself because after cataract extraction his patient got 20/15; the operation might have been more shabby and the risks greater than in another one in which the vision was only 20/100.

Dr. George F. Suker had performed the Smith-Indian extraction on private and clinical cases He had had a number of cases at the Cook County Hospital in which he had assisted his interns to do the operation. There was no doubt at all, that in doing the Smith-Indian extraction the beginner did undue damage and inflicted trauma to the eye. He used altogether too much pressure. One need not exert any more pressure in delivering the lens than in doing capsulotomy. Exercise of proper delivery pressure was just as essential as good assistants. The direction of the pressure exerted was also absolutely an important factor. Considerable traumatism was caused by the strabismus hook riding too hard and long on the limbus in the region of the ciliary body. The line of pressure should be directed to the entrance of the optic nerve and stay well within the limbus—a rocking pressure—and then the iris was not unduly stretched or crowded back upon the ciliary body and processes. A properly placed iridectomy, not too large, nor too small was an essential requisite.

Looking back upon his experience with cataract extraction of the Smith-Indian type and capsulotomy method, he had not come to a definite conclusion as to which method he would prefer in all cases.

In all patients in whom there was a marked arteriosclerotic condition of the peripheral vessels, he was not in favor of the Smith-Indian extraction. As far as the loss of vitreous was concerned, a limited loss did not signify much complication or reduction in vision, if any. So far as visual acuity was concerned, 20/20 was not the final

criterion. For, usually, one did not know what the patient's visual acuity was prior to the cataract. It might not have been 20/20. Nor did we in every instance know the anatomic condition of the macular area, disc, choroid or retina; also there might be a high refraction error present, associated with amblyopia ex anopsia and thus 20/20 could not be attained, no matter what method of operation was chosen.

The great objection he had to the Smith-Indian extraction was not the technic or the results obtained, but rather the unsightly pupil. In the majority of cases there was a retracted pupil. Why it occurred, he did not know.

Dr. George F. Fiske said there were things which struck him as remarkable in these reports, the first one of which was the fact of the very fine visual results. The other was the high percentage of loss of vision. It seemed to him unfortunate that there should be a loss of 20 per cent in 30 cases.

Dr. Harry W. Woodruff, of Joliet, Illinois, stated that last Thursday he attended a meeting of the Kansas City Eye, Ear, Nose and Throat Club. A report was read of the cataract operations performed by Col. Smith. He could not give this report in detail, but he remembered that there was a 25 per cent loss of vitreous.

Dr. Fisher and Dr. Findlay replied to the remarks made in discussion.

ROBERT VON DER HEYDT,
Cor. Sec.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

October 11, 1921.

Foreign Body in Lens.

W. LIKELY SIMPSON presented J. C. with the following history: While hammering a chisel four days ago something struck his right eye. Since then vision has been slightly off in the right eye and there has been slight redness of the eye.

Right eye, V.=20/20; conjunctiva red; pupil is widely dilated, due to the atropin. The X-ray was applied and the foreign body located. The pupil had been so small that a satisfactory examination has hardly been possible except for the last few hours. The foreign body was to be seen to the temporal side and slightly below the center of the cornea about seven o'clock. The foreign body seems to be in the posterior part of lens. There does not seem to be any opacity of lens.

X-ray findings are as follows: The foreign body is located 4 1/2 mm. to nasal side of center of the cornea, 4 1/2 mm. above the horizontal meridian, 4 1/2 mm. posterior to the anterior surface of cornea.

DISCUSSION. Dr. Anthony thinks the foreign body is in the posterior surface of the lens. In one other case like this that he has seen, an attempt at extraction failed.

Dr. Lewis thinks it best to treat the case expectantly.

Dr. Stanford and Dr. Blue think that in either case there will be a traumatic cataract, and it is best to treat it expectantly.

Transient Squint, Encephalitis.

DR. A. C. LEWIS presented Mr. W. W., age 44, who was referred to him on May 19, 1921, for diplopia of 4 days duration.

He had a paralysis of the right external rectus, with 20 degrees internal squint in the right eye. With his glasses, O.U. +3.00 sph., his vision was 20/40 and 20/20 in the right and left eye respectively. Pupils normal in size and reaction, as were the fields and fundi.

The health of the patient was good. The teeth, tonsils and nasal sinuses negative. Urinalysis negative, blood and spinal fluid Wassermann negative. K. I., 10 to 20 drops t.i.d., and purgatives prescribed.

July 2nd. Patient returned to city, has been sick in bed for two weeks with fever and general weakness thought to be malaria. R. The squint is now reversed, the 20 degrees internal squint has changed to a 20 de-

gree external squint. Only external turning is present, and this is quite weak. Vision reduced to 20/60 in this eye, but pupils, fields and fundus still normal.

Being now suspicious of brain tumor, the case was referred to Dr. Bunting. He made the Barány and other tests and made a tentative diagnosis of brain tumor, but was uncertain of its exact location.

Aug. 3, R.V.=20/30. No diplopia directly ahead, but present when looking to either side or below.

Oct. 11. The eyes are normal in every respect except for three degrees of esophoria which was probably always present.

His only general treatment has been K.I. continuously for 5 months.

Dr. Bunting now thinks that the intracranial trouble was probably due to pressure caused by ventricular obstruction. The true etiology may always remain a mystery.

Discussion. Drs. Stanford, Simpson and Shea, think that this is most likely a case of encephalitis lethargica.

Injury to Cornea.

Dr. J. B. Stanford presented Mr. G. W. H., white, 21, driver of a fire insurance patrol, who was injured on July 31, 1921, by the explosion of a bottle of "home brew" in his hand. Besides minor injuries to his hand, he had a lacerated wound of the face, extending from the margin of the lower right eyelid near the inner canthus to the cheek, another from the inner canthus of the right eye to the crest of the bridge of the nose, and the right cornea was cut thru from the temporal limbus to the nasal limbus. The anterior chamber was empty and the iris was in contact with the cornea, but there was no prolapse.

Under local anesthesia, the cornea was completely covered by conjunctiva brought up from below. The skin wounds were closed by means of silk sutures. Atropin was used in the eye. On the sixth of August the conjunctival flap had slipped off the cornea into its original position, the corneal wounds had healed smoothly, the anterior chamber was full and the pupil nearly round. On September 3rd, the eye was clear and the vision was 4/200 unimproved. The poor vision is due to the corneal scar and to lenticular opacities.

Discussion. Dr. Savage thinks that the interesting point in this case is that there is no prolapse of the iris.

Intraocular Hemorrhage.

Dr. Robert Fagin reported the case of Mr. C. P. M., age 19 years, freight clerk at a local depot.

Previous Eye History: No trouble with eyes until September the 15th, 1921. While playing pool, he was struck a hard blow in the region of the left eye. There was very little pain following. Two days later the eye and the region around it became "blood shot." The third day blood was seen on the inside of the eye, so that patient consulted an oculist.

Findings at ten o'clock: Vision in O. D. 20/20; vision in O. S. 20/120, with some blood in anterior chamber.

At two o'clock the same day the entire globe filled with blood. Eye was painful, red and excessive lacrimation. Patient was put to bed for several days. Cold applications were used freely. The blood is now clearing up, but, as yet, we have been unable to see just what has happened, and what was injured by this blow.

Discussion. Dr. Anthony has not heard the history in this case, but thinks it now one of secondary glaucoma.

Dr. Hooker thinks that cloudiness in the anterior chamber is an inflammatory exudate.

Dr. Fagin can see no explanation as to why the hemorrhage was delayed. There is no increased tension, and there has been no pain since the first day.

Chorioretinitis.

Dr. Fagin also reported the case of Mr. B. Z. C., age 31 years, shoe clerk.

Previous History: Patient consulted Dr. Herron of Jackson, Tennessee, seven years ago on account of rapid loss of vision in right eye. The Doctor explained to the patient that there was a "spot" in the back part of the eye, and that he could not in

any way remedy it. The vision has been very poor in this eye ever since. Two weeks ago, patient noticed that vision in left eye had begun to fail, so he consulted me about it.

Findings: Vision in O. D. fingers at two feet; vision in O. S. 20/30.

Pupils dilated and in dark room, in the macular region of the right eye, a large white spot is seen. In this area there is total destruction of both choroid and retina. Below and adjacent to this, there is another area of old chorioretinitis, also, more is seen around the optic nerve. The macula of the left eye shows a very small area of beginning chorioretinitis, which gives him a vision now of 20/30.

Discussion. Dr. Hughes advised a spinal fluid Wassermann and salvarsan.

Drs. Stanford and Simpson advised elimination of all possible foci of infection, and antiluetic treatment.

Corneal Ulcer.

Dr. Fagin also presented Mr. A. D. Parkin, Arkansas, age 35 years, farmer.

History: Several years ago patient had a corneal ulcer on the left eye, which considerably impaired the vision in this eye for a time, but vision later improved. A week ago patient had chills and fever followed by herpetic lesions, which formed on his lips, and one formed on the old corneal ulcer on the left eye. This lighted up the eye condition again; so after years of inactivity, he has another corneal ulcer.

The patient was presented to show that corneal ulcers remain quiet for years, and, then, at any time, when the general health is lowered, they will light up again and give trouble.

S. S. Evans,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

November 19, 1921.

Dr. A. C. Magruder presiding.

Atrophy of Iris.

A. C. Magruder, Colorado Springs, presented a youth aged sixteen years, who had had congenital cataract in each eye, and had been operated upon by needling at the age of seven years. The vision of the right eye was 20/100, and of the left eye 16/200. The vision of the left eye was improved to 20/100 with correcting lenses. The case was shown on account of a very marked atrophy of the iris of the left eye, and also because of the great density of the capsular remains. Needling had been done twice, the second time without improvement. What did the members think of doing a simple extraction?

Discussion. C. E. Walker, Denver: If you cannot get thru with a Ziegler knife try Panas' forceps. The lens may be calcareous. If extraction is attempted the incision should be made below.

Anterior Polar Cataract and Persistent Pupillary Membrane. Muscular Anomaly; Discussion of Lethargic Encephalitis.

E. R. Neeper, Colorado Springs, presented a young woman aged seventeen years who had come complaining of occasional diplopia. The eyes were said to have been crossed for a time during early childhood, and then to have remained straight until nine months previously, when the right eye had turned slightly up and out. There was a small dense opacity to the outer side of the center of the anterior capsule of the right eye, and to this opacity were attached two brown strands originating in the region of the lesser arterial circle of the iris on the temporal side. There were three much shorter strands attached only to the iris in the same location. There was no history of injury or disease. The corrected vision of each eye was normal. The cover test indicated monocular fixation. The Maddox rod showed esophoria of five degrees. Either eye turned up and out while not fixing. Did the iris strands disturb the ocular movements?

Dsicussion. C. E. Walker, Denver, did not think that the attachment of the strands to the iris and lens had any connection with the muscular irregularity. The latter should be

analyzed with a candle light and with a red lens over one eye, placing the candle in a fixed position and moving the head in different directions; making notes of the findings and then taking them home for study. The patient might be developing a case of lethargic encephalitis.

W. H. Crisp, Denver, agreed that there was no connection between the anomalies in the lens and iris and the muscular defect. The strands attached to the iris and lens probably represented a form of persistent pupillary membrane, and it was further likely that the muscular irregularity was due to a congenital defect of innervation.

Dr. Neeper said that he had made the candle test, tilting the head in various directions, and the test was negative.

W. C. Finnoff, Denver, referred to a case of lethargic encephalitis occurring in a Denver surgeon. There had been an attack of influenza complicated by pneumonia. After a while double vision was noticed. Examination revealed a partial paralysis of the left inferior oblique muscle, and optic neuritis in each eye. The patient also had a great deal of difficulty in locomotion. After a while his hyperphoria improved very rapidly. The neuritis lasted about two months, but was not followed by atrophy. The case was pretty certainly one of lethargic encephalitis. Another patient who had had a faintly positive diagnosis of lues, looked slightly lethargic on coming into the office. There was complete paralysis of the external rectus muscle of the left eye, and the patient complained of severe headaches. He had previously been gone over from head to foot. While the fields were being taken the patient became very sleepy and fell off the chair. Dr. Finnoff made a diagnosis of lethargic encephalitis. He later heard that the patient had died.

Whether to Operate for Anterior Synechia in Patient's Only Eye.

E. R. Neeper, Colorado Springs, presented a man aged thirty-three years whose left eye had on October 6 been ruptured by a rock flying from an electrical drill. The blow had fallen on the outer part of the sclera, and had produced a rupture of the cornea about seven mm. long near the temporal limbus. At the time of the report the vision of this eye was 20/40. The other eye had been previously lost. There was a broad adhesion of the iris to the corneal scar. Should an operation be attempted to free this synechia, and in what manner?

Discussion. C. E. Walker, Denver. It is perhaps a little early to interfere with this eye. Secondary glaucoma is the only complication to fear. If you can keep track of the man there is no hurry. If an attempt to free the iris is made, I advise passing a knife completely across the pupil and making the incision to include the iris as the knife passes out. All you need is to free the iris at the point of attachment to the cornea.

J. M. Shields, Denver, thought that a man with only one eye should be prevented by medical or other control from endangering his second eye in such an occupation as mining.

G. F. Libby, Denver, recalled a case of perforating ulcer of the cornea which had resulted in adherent leucoma; and in which the patient had returned twelve years later with glaucoma in the same eye.

Congenital Paralysis of the External Rectus.

A. C. Magruder, Colorado Springs, presented a woman aged thirty years who gave a history of having had an annoying diplopia as long as she could remember, which occurred when she looked to the left. The vision of the right eye was 20/20 plus, and of the left eye 20/40 plus. There was a moderate astigmatic error in each eye. Apparently there was complete paralysis of the left external rectus. A blood Wassermann was negative. The case seemed to be one of congenital absence or congenital paralysis of the external rectus muscle.

Discussion. W. C. Finnoff, Denver, thought there were some muscle

fibers present. In that case the thing to do was transplantation of a half of the superior and a half of the inferior rectus to the normal point of attachment of the external rectus, as discussed by Woodruff and O'Connor at the recent meeting of the Academy of Ophthalmology and Oto-Laryngology.

W. H. Crisp, Denver, referred to two cases of apparent congenital absence of the external rectus which he had brought before the society several years previously. In each of these cases the patient had experienced no appreciable inconvenience and did not complain of diplopia.

Episcleritis.

A. C. Magruder, Colorado Springs, presented a woman aged fifty-three years, who had come complaining of redness and tearing of the right eye, which had lasted for ten or eleven months. She had been under the care of two other oculists. There was a definite marginal keratitis at the nasal side of the right eye. There was a marked thickening of the conjunctiva at the nasal side, with considerable enlargement of the bloodvessels. After removal of two lower molars and curetment of their sockets, the keratitis had improved considerably, but the episcleritis had not been affected. During the previous nine months, the episcleritis had attacked every part of the visible sclera, altho at no time occupying more than one-fourth of the total area. Examination of the nasal sinuses and general physical examination were negative. Treatment had consisted of atropin, dionin, hot applications, and powdered mild chlorid of mercury massaged in the inflamed areas.

Discussion. C. E. Walker, Denver. I keep these old cases of episcleritis on the iodids and tonics in addition to the local treatment.

W. A. Sedwick, Denver, thought that the case was likely of gastrointestinal origin.

W. C. Finnoff, Denver. The nasal side of the disc is slightly swollen. Beyond the nasal margin of the disc there is something which looks like a grayish exudate, with the bloodvessels running partly thru it, and extending almost half-way round the disc. Some of the peripheral bloodvessels are in poor condition. Scleritis coincident with vascular disease of the fundus is often due to tuberculosis. The way to determine that tuberculosis is playing a part is by obtaining a focal reaction with tuberculin. It would probably be safe to run the tests up to five mg. of old tuberculin before deciding that the disease is not present. In this eye there is not much danger of hemorrhage.

Powder Grains Embedded in Sclera.

A. C. Magruder, Colorado Springs, presented a boy aged seventeen years, who in July, 1921, had been injured in both eyes by an explosion of black powder. The cornea of each eye had been badly burned, and there had been innumerable powder deposits in the face and eyes. Two hours had been spent in removing the deposits of black powder from the corneas. A few grains, however, still remained in the sclera. Should removal of these be attempted by electrolysis or extirpation?

Discussion. W. C. Bane, Denver, felt that apart from cosmetic purposes there would be no advantage in attempting removal of the particles.

Wm. H. Crisp,
Secretary.

ROYAL SOCIETY OF MEDICINE.

Section of Ophthalmology.

Meeting of November 11, 1921, Sir William Lister occupying the chair.

Cyst of Krause's Gland.

Mr. Humphrey Neame showed three interesting cases. The first was one of cyst of Krause's gland. He did not feel quite sure of the diagnosis, as those glands were not so common in the lower fornix as in the upper.

His second case was that of a lad aged 16 who had **papular formations in the upper lid.** He had noticed nothing amiss until the beginning of October, when there was a marked swelling of both upper and lower lids,

and some swelling and tenderness of preauricular glands. The conjunctival secretion showed no eosinophiles, and the section showed only a zone of round celled infiltration, not sufficient to account for the papular formation. The character of the case would be settled on the histologic evidence.

Ocular Tuberculosis.

Mr. Neame's third patient had tuberculosis of the conjunctiva. The boy went for a holiday last year 40 miles away, going down by cycle; and at the end of the journey he was very exhausted. After returning to work, while stooping down, he felt something "go" in the left eye, and from that day the sight of the eye had gradually failed, so that in 6 weeks he could do no more than perceive a hand close in front of him. In September, 1920, he noticed swellings in the neck, and in March this year a cough started, and watering of the eye previously sound (the right). Sent to a tuberculosis hospital, the diagnosis made was Hodgkin's disease; there were no signs of tubercle in the chest, and no tubercle bacilli were found in the sputum. He had lost a stone in weight in a year, but there had been no appreciable loss during the last three months.

Four months ago he was admitted to Moorfields with iridocyclitis of the left eye; there was a hazy cornea, and the anterior chamber was full of a whitish substance. The eye was excised. A section of it was shown. The anterior chamber was filled with cellular and fibrous material, and iris and ciliary body were practically destroyed. Last month a part of the conjunctiva of the right eye was excised, and that showed a fairly typical tubercle formation. Two small glands from behind the ear were excised, and the material crushed and given to a guinea pig, but beyond a local reaction it produced no definite illness. The gland showed marked fibrous tissue formation, indicating that the process must have been very chronic.

Discussion. Mr. Mayou and Mr. Harrison Butler thought it likely that the cyst was one of spring catarrh, and advocated a further test for eosinophilia.

Operation for Ptosis; Angioma of Retina.

Mr. Lindsay Rea exhibited a case showing the result of a Poulard operation for ptosis, and one of *angioma of the retina*. With regard to the case of angioma, he referred to the similar case examined by Mr. Collins and described in the Ophthalmological Society's Transactions in 1892 and 1894. In the present case there was a large white mass over the macular area, and a large vein ran down the disc. The growth appeared to be pushing the retina in front of it.

With regard to the case of ptosis, he chose the Poulard operation in preference to a Motais, because it was then all in front of one, and one could see exactly how much to open the eye.

Discussion. The Chairman, speaking of the angioma case, said this condition must be of great rarity. The white masses in the fundus in this case must be decolorised blood clot, which was being gradually absorbed, like the "melting snow" variety seen in cases of large subchoroidal hemorrhage. As to the case of ptosis, he pointed out the difficulty of everting the lid after a Motais operation if a foreign body got into the eye. He himself favored the Hess operation for ptosis.

Mr. Treacher Collins did not consider angioma of the retina such a very rare condition; he spoke of several cases he had seen. With regard to the ptosis case, he preferred the Motais to the Poulard operation; he had done the former three times, and the results pleased him greatly. The present patient could not completely close his eye, so that it was probably open during sleep. But with a Motais, complete closure was ensured during sleep.

Abnormality of Iris.

Mr. R. C. Doyne exhibited a case of congenital malformation of iris and anterior chamber. The iris showed an absence of anterior layers in many

places, and there was a hole in each eye thru which the red reflex could be obtained. In the left eye the fibers of the suspensory ligament could be seen. Also the angle of the anterior chamber was malformed and appeared to be filled with whitish substance. Strands could be seen running from the posterior surface of the sclerocorneal junction to the anterior surface of the iris, and the margin of the cornea was opaque. The child was highly strung, but not particularly backward.

Discussion. The Chairman referred to a case he once had in hospital of a man with nine pupils, one of them almost central, the other eight ranged peripherally. Eventually he developed glaucoma, probably having a relation to the congenital defect in the development of the angle of the anterior chamber, but there was no congenital defect in the iris.

Mr. Mayou and Mr. Collins discussed the probable causation of coloboma with bridge. Mr. Collins stating his opinion that the mesoblastic portion of the iris had two sources of origin; the anterior layer of the fibroplastic sheath and the blood vessels which grew forwards from the periphery of the anterior ciliary arteries, beneath the pupillary membrane.

The New Psychology and Problems of Vision.

Dr. Charles F. Harford said that the attention of the ophthalmologist has hitherto been mainly directed to the anatomic and physiologic aspects of problems of vision. In his book on Diseases of the Eye, Parsons said, after tracing the processes of vision from the external object to the cortex cerebri, "here the nervous impulse is transformed into a pyschic impulse, which is not, and probably never can be, understood." Dr. Harford claims that psychology can offer an important contribution to supplement physiology, and that psycho analysis throws new light upon human thought.

Many are studying psychopathology without having grounded themselves in normal psychology, and his object in this paper is to formulate a scheme of the working of the "Psyche" which might help to interpret many of the problems of vision. He exhibited diagrams representing the mechanism of the Psyche, divided into three sections: cognition, affection, (standing for the emotional result of cognition) which led to action. Secondly, he showed a disc presenting the field of consciousness, which would present to the Psyche the visual and other images from external objects or from the memory. His third diagram showed six compartments which he referred to as the store chambers of the Psyche, namely, results of careful observation, results of casual observation, amnesia of common life, pathologic repression, infantile impressions, and instinctive and hereditary factors.

Emphasis was laid by the author on the emotional part of the Psyche, that which activates each mental concept, which Bergson called the "energie spirituelle." He proceeded to deal with the factors of repression, association, dissociation, and appreciation. He said the vision of the infant is only gradually evolved, not because of any organic defect of structure, but because of the gradual nature of the awakening of the intelligence. Strange objects, seen for the first time by normal adults, could not be recognized until they could be related to some previous visual memory.

Thrombosis of Retinal Vein; Hole at the Macula.

Mr. Arnold Williamson first referred to the careful paper on holes in the macula published by the late Mr. Coats, in which he summarised the various theories of causation. Monteith Ogilvie considered there were two factors concerned; the fact that the retina is thinnest at the fovea, and thicker around it than elsewhere, and the fact that waves of disturbance passing thru the eye meet at the posterior pole and tear the fovea by "contrecoup." Fuchs attributed it, in traumatic cases, to mild traumatic retinitis, the slight serous exudate rupturing the membrana limitans externa,

so causing the appearance of a macular hole.

Coats believed edema was the underlying cause, stating that a hole had never appeared less than 60 hours after the injury, also that opacity in the retina had been observed after injury in a case in which a hole subsequently developed. In 1908, however, Kipp and Alt published, in the AMERICAN JOURNAL OF OPHTHALMOLOGY, a case in which a boy was shot thru the orbit, tearing the optic nerve and its sheath, and entering the skull. On the following day the retina was whitish, and vessels narrow, except for a vein passing from macula to disc. At the macula was a red deep round spot, one-third D; two days later the retina was more opaque. Four days later the eye was excised, and there was a large hole at the macula, surrounded by swollen retinal tissue. There was evidence of edema everywhere. Kipp and Alt consider that the retina at the macula can be torn by contrecoup.

Mr. Williamson showed slides of this case of his because they made clear the dependence of the formation of a hole in the macula on the occurrence of subretinal edema associated with thrombosis of the central retinal vein. The patient was a woman aged 62, whose sight began to fail 14 years ago. For two years, until excision of the eye in July last, she had continual pains in the head. The eye was excised because of absolute glaucoma. Thirty years ago she had a fall, blacking both eyes, but the sight was not impaired. The excised eye showed a corneal nebula, a cellular exudate adherent to the posterior surface of the cornea in places, and hyalin exudate passing round the lens and causing some adhesion of the iris to it. There was no cupping of the disc.

He exhibited sections on the screen by means of the epidiascope. There was an absence of the inner nuclear layer and inner reticular layer, and the retinal pigment layer was separated from the inner layer of the choroid. There was also some edema in the outer molecular layer of the perimacular region. The special point was, that the cyst was formed not in the retina, but in the accumulation of edematous material between the membrana limitans externa and the retinal pigment layer. In consequence of the presence of this cyst, the outer layer of the retina appeared to undergo a degenerative process, so allowing of the formation of a hole.

The second case was also discussed at length, and sections exhibited and demonstrated. In both cases there seemed to be a toxic influence, as shown by the iridocyclitis, acting on the retinal veins and producing thrombosis, and acting on the delicate macular choroidal capillaries causing regeneration of their walls, increased permeability to fluid, and hence edema; this fluid then osmosed thru the potential space between the rods and cones and the pigment epithelium, preventing the access of nutrient materials from the choroidocapillaris, so that the superjacent retina degenerated and formed a hole.

DISCUSSION. Mr. M. S. Mayou, showed, by the epidiascope, sections from a typical case of albuminuric retinitis which he had some years ago. Here exudation was seen in two places; interretinal exudation, and subretinal exudation. He believed the albuminous fluid in the layers of the retina was derived from the retinal vessels, but the subretinal fluid he thought came from the choroid. The two had a different consistence and response to the staining reagent.

H. DICKINSON.

SPECIAL REPORT

UNION MEDICAL COLLEGE, PEKING, CHINA, AND THE WORK OF ITS DEPARTMENT OF OPHTHALMOLOGY.

GEORGE E. DE SCHWEINITZ, M.D. L.L.D.

PHILADELPHIA, PA.

During a recent visit in Peking (September 1921), on the occasion of the formal opening of the Union Medical College of that city, the ceremonies of which included scientific addresses, papers of notable interest and clinical conferences conducted with admirable precision and illustrated with abundant material, opportunity was afforded of observing and participating in the work of the Department of Ophthalmology. The account which follows it is trusted may be of interest to JOURNAL readers:

For the work of the out patient department, or dispensary, the necessary space is allotted in the hospital, and consists of a waiting and record room, excellent dark rooms for ophthalmoscopy, for retinoscopy and for refraction, a small operating room suited to minor surgical procedures, each equipped with admirable facilities and instruments of precision.

One is immediately impressed with the care with which the records are made, and the thoroness with which each patient is examined, as may be inferred from the attached blank. (See p. 142.) Necessarily, the history sheets are replete with data of real value.

For the in patients 5 per cent. of the available beds of the hospital is allotted, not as yet sufficient to meet the large opportunities here presented for the investigation of many important ophthalmic problems, a deficiency, it may be assumed, which will be supplied at a later date.

The Department of Ophthalmology of the Union Medical College of Peking is fortunate in that is has secured the services of Dr. Harvey J. Howard, as Professor and Director, whose table of organization follows.

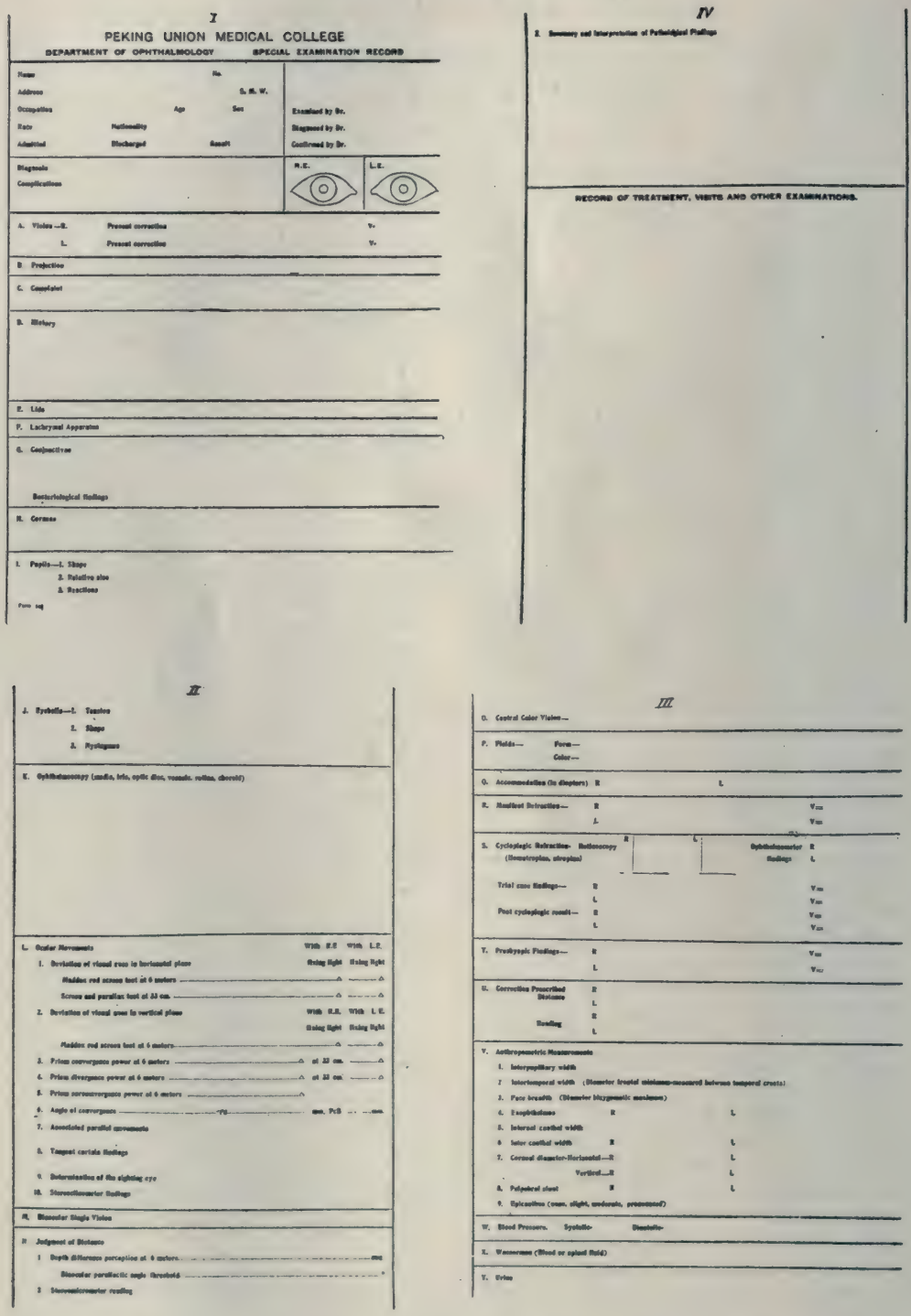
Professor	Dr. H. J. Howard
Associate	Dr. T. M. Li
Associate	To be appointed
Clinical Assistant	Dr. H. T. Pi
Clinical Assistant	Dr. T. T. Dzen
Clinical Assistant	To be appointed
Assistant Resident	Dr. W. P. Ling
Senior Interne	Dr. John Hong
Assistant Technician	Kuan Wen Yu
Secretary	Miss M. V. Woodman
Illustrator	C. H. P'u

Dr. Howard's large experience, originally acquired in Canton, and later in Peking, ably supplemented by his Chinese associates and assistants, coupled with his familiarity with the customs and language of the country, his administrative ability and intelligent grasp of problems presented, constitute assets of unusual value.

During the past year, 2074 new patients applied for treatment, the number of visits recorded being 13,130; the total visits per patient averaged 6.33, an average which Dr. Howard regards as very high. In addition to this, there were 2,405 visits from private patients, three-fourths of which were paid by foreigners and one-fourth by Chinese.

Fully 60 per cent. of the new patients (referring now to the Chinese) have trachoma, or the sequels of this disease, and the opportunities of studying all the stages of this affection are abundant[1]. Some unusually interesting observations have been made pertaining to the communicability of trachoma, to the incubation period, that is, the time which must elapse before the earliest manifestations of the disease are evident, and when the exact date of contact with an eye definitely trachomatous is known, to the corneal lesions, especially at the lim-

1. In this connection it is interesting to record the trachoma experience as reported by Dr. W. S. Thacker Neville in Moukden, Manchuria. Out of a total of 2,287 patients, 1023, or nearly one-half of them, were the subjects of this disease.



I

PEKING UNION MEDICAL COLLEGE

DEPARTMENT OF OPHTHALMOLOGY SPECIAL EXAMINATION RECORD

Name No.

Address S. M. W.

Occupation Age Sex

Race Nationality

Admitted Discharged Result

Examined by Dr.

Diagnosed by Dr.

Confirmed by Dr.

Diagnosis

Complications

R.E. L.E.

A. Vision —R. Present correction V=

L. Present correction V=

B. Projection

C. Complaint

D. History

E. Lids

F. Lacrymal Apparatus

G. Conjunctiva

Bacteriological findings

H. Cornea

I. Pupils—1. Shape

2. Relative size

3. Reactions

Form eq

IV

J. Summary and Interpretation of Pathological Findings

RECORD OF TREATMENT, VISITS AND OTHER EXAMINATIONS.

II

J. Eyeballs—1. Tension

2. Shape

3. Hydrogenes

K. Ophthalmoscopy (media, iris, optic disc, vessels, retina, choroid)

L. Ocular Movements With R.E Uning Right With L.E. Using Right

1. Deviation of visual axes in horizontal plane

Maddox rod across test at 6 meters ..... Δ ..... Δ

Across and parallax test at 33 cm. ..... Δ ..... Δ

2. Deviation of visual axes in vertical plane With R.E. Using Right With L.E. Using Right

Maddox rod across test at 6 meters ..... Δ ..... Δ

3. Prism convergence power at 6 meters ..... Δ at 33 cm. ..... Δ

4. Prism divergence power at 6 meters ..... Δ at 33 cm. ..... Δ

5. Prism convergence power at 6 meters ..... Δ

6. Angle of convergence ..... °/Δ ..... mm. P.D ..... mm.

7. Associated parallel movements

8. Tangent curtain findings

9. Determination of the sighting eye

10. Stereoscleroscope findings

M. Binocular Single Vision

N. Judgment of Distance

1. Depth difference perception at 6 meters ..... mm

Binocular parallactic angle threshold ..... °

2. Stereoscleroscope reading

III

O. Central Color Vision—

P. Fields— Form—

Color—

Q. Accommodation (in diopters) R L

R. Manifest Refraction— R V=

L V=

S. Cycloplegic Refraction- Retinoscopy R L Ophthalmometer R

(Homatropine, atropine) Findings L

Trial case findings— R V=

L V=

Post cycloplegic result— R V=

L V=

T. Presbyopic Findings— R V=

L V=

U. Correction Prescribed Distance R

L

Reading R

L

V. Anthropometric Measurements

1. Interpupillary width

2. Interfemporal width (Diameter frontal minimum-measured between temporal crests)

3. Face breadth (Diameter bizygomatic maximum)

4. Exophthalmos R L

5. Internal canthal width

6. Inter canthal width R L

7. Corneal diameter-Horizontal—R L

Vertical—R L

8. Palpebral slant R L

9. Epicanthus (none, slight, moderate, pronounced)

W. Blood Pressure. Systolic- Diastolic-

X. Wassermann (Blood or spinal fluid)

Y. Urine

Record Blank Department of Ophthalmology, Peking Union Medical College. One-third of full size.

bus, and to the effect of early treatment in staying further elaboration of the affection. A report of these studies will doubtless be published in the near future, and cannot now be anticipated in further description. The corneas and conjunctivas of each trachoma patient, suited to such examination, are studied with the corneal microscope, and nowhere else has your correspondent seen more satisfactory use of this excellent instrument in these circumstances.

The routine treatment consists in a moderate "expression" of the affected area, performed with as little traumatism as possible. The "follicles" having been picked open with a cataract knife, their contents are expressed with Prince's forceps, or squeezed out by means of pressure exerted with the aid of gauze or cotton sponges wrung out of a saturated boric acid solution, or a 1-5,000 bichlorid solution. Instillation of a few drops of olive oil or of paraffin completes this stage of the procedure. The patient is required to return on the following day, when the everted lids are gently rubbed with swabs dipped in oil, whereby any adhesions which may have been formed are broken up. Depending upon the severity of the case, after cocain anesthesia, "rubs" with a cotton wound applicator, dipped first in bichlorid solution (1-1,000) and next in dry boric acid powder, are repeated daily, or every other day, followed by iced compresses. When six such treatments have been given, the strength of the bichlorid solution is increased to 1-500. In general terms, discomfort usually ceases after the first three or four treatments. If necessary, and to shorten the length of treatment, a second expression operation may be, and often is, performed.

Dr. Howard adopted this method of treating trachoma largely because of the good results he had witnessed following its employment in the New York Eye and Ear Infirmary about ten years ago, and altho many other procedures and applications have been tried by him and his assistants in their work in China, none has proved to be as satisfactory.

The description of this method of treatment is recorded because, well known tho it is, and often utilized in many clinics in our country, too frequently it has been abandoned, largely, it would seem, without sufficient trial, and where the technic has not been carried out systematically and with thoroness. This procedure, or at least one very similar to it, constituted the routine treatment of trachoma in your correspondent's ward in the Philadelphia General Hospital many years ago; it was gradually displaced for other methods, but it may be questioned whether they were more advantageous. Certainly it accomplishes its results, to wit, the removal of the morbid material with less traumatism than many other varieties of expression, brossage and grattage. Dr. Howard has compared the effects of these rubbings with applications of silver nitrat, sulphat of copper, and carbon dioxid snow, but has always returned to the technic which has been described. It is interesting to note that he and his assistants are impressed with the value of "zinc drops" (1/2 per cent. solution of sulphat of zinc being instilled by the patient five or six times daily). Should the condition prove to be stubborn, these "drops" are alternated with a glycerit of tannin mixture; boroglycerid is also used. During the past war "zinc drops" were much used in the treatment of trachoma as it appeared among the Chinese coolies in the B. E. F., and also in the A. E. F., as described by Dr. Derby in his account of the trachoma problem in France. (A.J.O. v 2 p. 500).

Naturally, in the presence of marked corneal involvement, that is, in addition to pannus, superficial keratitis, the technic described is delayed until the active inflammation has subsided under the influence of the usual remedies. In suitable cases, simple and combined excision of the tarsus (Heisrath's operation) is performed as occasion may require. A special tra-

choma clinic is in operation, where the treatment is carried out, thus preventing the mingling of trachomatous and nontrachomatous patients.

Refractive errors are in all suitable cases corrected, after the use of a cycloplegic, usually homatropin, and there is an admirable arrangement for this work, consisting in a series of booths, each containing a trial case, a suitably constructed electric bulb for retinoscopy and an electric ophthalmoscope, and each booth is in direct line with an artificially illuminated type card, six meters distant. The assistants in charge of this work are thus enabled to make all the usual tests without changing their own or their patient's position; should ophthalmometric examinations be required, the instrument is close at hand.

The incidence of myopia is high, fully 53 per cent. of the patients presenting this type of refractive error, not infrequently in high degree, and often associated with the gross fundus changes common to this condition. It is more than probable that the imperfection in illumination in Chinese work shops may be one of the determining factors in this high percentage of myopia, but the frequency of corneal scars, the result of trachoma and of keratitis, must also be reckoned with in this regard. As is well known, the frequency of myopia among Egyptians has been ascribed to this cause.

Fine vitreous changes, independent of myopia or detectable uveal tract disorders, consisting in delicate flakes and strings, almost always in foreigners who in other respects are apparently entirely normal and who are comparatively young in years, are quite frequent. Generally the patients are unaware of their existence, and they are discovered during the routine examination incident to the measurements of refractive errors. Dr. Howard, who has carefully studied a number of these cases, is inclined to ascribe the lesions to focal infections. It is the impression of your correspondent that similar vitreous changes have been noted with undue frequency among the people of foreign birth residing in tropic and semitropic countries. It is probable that metabolic studies would reveal that they are an interpretation of faulty diet. Indeed, this was apparently the case in some investigations made by your correspondent similar to those undertaken to eludicate the causes of certain obscure types of scleritis and uveitis, where unquestionably the diet factor was important.

Anomalies of muscle balance receive careful attention, not only the usual heterophorias and common types of comitant squint (corrected by advancement, Reese's muscle resection being a favorite procedure), but also those conditions which require tenotomy of the inferior oblique, performed according to the direction of Duane and White and to meet the indications as described by these authors. The results have been most satisfactory, and the opportunities for employing this procedure more frequently present themselves, or perhaps are more frequently seized, than is usual in ordinary dispensary practice. For the past two years the Union Medical College has rendered service to the Aeronautic Department of the Chinese Government by examining and classifying all their flying cadets; Dr. Howard's large experience and excellent work at Hazelhurst Field during the war being especially useful in this respect.

Altho pulmonary tuberculosis is common in China, its ocular manifestations among the patients of the Peking Clinic are comparatively rare; during the past year, in only two cases has this infection been definitely demonstrated as the etiologic factor, in both instances uveal tract disorders. Tuberculin treatment is utilized with satisfactory results. The investigation of phlyctenular keratoconjunctivitis, a frequent affection, has not satisfied Dr. Howard and the members of his staff that this disease is a manifestation of tuberculosis.

Ocular syphilis is common in all its usual varieties, and sometimes in rather unusual lesions, for instance, gumma of both upper and lower lids.

A rare condition, subconjunctival granuloma, is occasionally encountered (three cases in one year).

The opportunities in ocular pathology are admirable. Specimens have been sent, and are being sent, by medical missionaries from all over China. In no other way could a large and valuable collection be made, classified and examined in one laboratory, because it is difficult to persuade a Chinese patient to permit the enucleation of an eye, no matter how insistent the indications are for its removal. With the opening of the new laboratory, a systematic investigation of these specimens will begin, and in part preparation for this work Dr. T. M. Li will spend his furlough in America, and devote his time to additional studies in the pathologic histology of the eye.

Cataract, Dr. Howard informs your correspondent, is comparatively uncommon in North China as compared with South China, and in his clinic the operations do not exceed in number, in fact, do not equal the number, of those which would be performed in an American clinic of equal size. The operation often performed is an intracapsular extraction, but not the so-called Indian or Smith method, preceded by a conjunctival flap so arranged that it can be stitched in place at the conclusion of the operation—a real advantage should there be loss of vitreous.

Glaucoma is common, and in the chronic varieties of the disease corneoscleral trephining (Elliot's operation) is often performed.

Naturally, toxic amblyopias of the usual types are encountered, but now and then a patient comes under observation presenting the visual interpretations of axial neuritis (intoxication amblyopia) whose history fails to indicate with any certainty the etiologic factor. It is possible in some of these cases that the optic nerve changes are due to large doses of "Chinese medicines," but in most instances the content of such medicine is unknown. Doubtless when the study of these medicines, now being undertaken by Dr. Reid of the Union Medical College in Peking, has progressed further, more information will be available. In one case examined, the loss of vision and optic nerve changes followed the free use of a decoction of vinegar in which green peppers had been steeped. The rapidity with which the blindness developed, however, suggested to Dr. Howard and his associates that the vinegar may have been contaminated with methyl alcohol; none of it was available for analysis.

Some effort has been made to investigate the eyes of those Chinese who have come from, or are residents in, the districts where starvation is prevalent, without finding gross corneal changes, for instance, keratomalcia. Only once did your correspondent see in a "starved man" eyes which were destroyed as the result of keratitis. The patient was not in the Peking Clinic.

Reports have come from some regions in China of sudden blindness, probably, it would seem, due to retrobulbar neuritis, followed by cataract formation, occurring usually in women after prolonged violent excitement and fits of anger. Such cases have not been observed in the Peking Clinic, nor have Dr. Howard and his associates noted optic nerve changes in the natives which differed in their etiologic relationships from those commonly observed in Western Clinics, save only as noted in connection with the toxic amblyopias. The usual ocular results attributed to focal infection are observed, but apparently not more frequently than in our own clinics, and presenting no special peculiarities.

One of the important functions of the Peking Union Medical College is to afford opportunities for graduate instruction, for instance, to medical missionaries; and in the Department of Ophthalmology such courses are in operation. Your correspondent desires to pay a tribute to the Medical Missionaries. Their earnestness, the excellence of their work and its far reaching effects, their fine disregard of difficulties, discouragements and danger, and their unfailing "manly pluck" are beyond praise.

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NAMING AND CLASSIFICATION OF CORNEAL DISEASES.

Some readers may have queried, what is the use of printing a paper like that beginning on page 8 of the January number? The services it can render differ widely from those to be expected from most of the articles here published, but we believe that they are real and important. As our literature stands now, this collection of names for corneal conditions may serve as a glossary of terms not elsewhere brought together, but any one of which may be encountered in reading the literature of our specialty. From the synonyms thus grouped, one may understand the terms that are unfamiliar by those already known; and some will be found unfamiliar by any one, who has not been searching recently thruout the literature as widely and deeply as has Dr. Calhoun.

But the great service of such a paper is the bringing home to every reader how unsystematic, bulky, illogical, burdensome and unsatisfactory our nomenclature of corneal conditions has become; and how much need there is to recast it upon rational scientific lines. The abuses of language here revealed have arisen slowly, one at a time; and have been perpetuated and extended without any appreciation of the bulk of the list of useless words thus accumulated. To get rid of these we must have careful study and discussion of them by a group of ophthalmologists most competent for the purpose, and a general agreement by all of us to use the name for each condition found most appropriate. Only by such a step can we do away with the need for learning and carrying in mind so many useless terms, and get rid of the uncertainty and indefiniteness that arise from overlapping meanings and the perpetuation of the implied erroneous conceptions of pathology.

These names have been given on account of a chance association or a fancied relationship, without any sufficient reason for thinking of them in the connection that the name implies; or they are retained after the related

condition has changed or lost its importance in our conceptions of general pathology. Why should a certain form of inflammation be called eczematous, when eczema is a disease of the skin, and this inflammation is seen only in a mucous membrane? The resemblance of eczema to catarrhal inflammation of mucous membranes does not justify such use of the term, neither does the accidental coincidence of eczema with the corneal inflammation. Why should keratitis be called scrofulous, when the term scrofula has lost its significance and importance: why should it be known as phlyctenular, when this applies only to a single brief stage and one in which the lesion is not usually seen. Some of us may think of it as anaphylactic. But must this term be added to all the others to burden our memories and increase the uncertainty and confusion regarding a rather common condition; to be later cast aside, perhaps, when our ideas of anaphylaxis have become slightly different and more definite than they are now?

The fact that a pneumococcus ulcer tends to creep over the surface of the cornea, rather than to excavate deeply in a certain fixed location, is interesting and clinically important. But that does not justify giving it the name "ulcus serpens." Neither does the fact that pus from it often settles at the bottom of the anterior chamber justify calling it "hypopion ulcer." The hypopion may be there one day and absent the next, yet it is the same ulcer with the same etiology, dangers and treatment.

That certain linear opacities in the cornea may seem to show a resemblance to the lines that go to make up letters, is an interesting observation; but does not justify the burdening of language with the term "buchstaben keratitis," promptly translated into "alphabet keratitis." Interstitial inflammation is a pathologic misnomer when applied to the cornea, that has no interstitial tissue, in the sense in which it is recognized in the kidney or liver. The term parenchymatous keratitis is a little better from the anatomic standpoint, but it gives no indication of etiology, prognosis or treatment.

Perhaps enough has been said to show sufficient reason for calling attention to the very unsatisfactory condition of the nomenclature and classification of corneal diseases. What is to be done to improve them? First we can be careful not to use those terms that are manifestly inappropriate, or superseded, or consist merely of partially descriptive terms translated into Latin or some foreign language, like creeping ulcer into "ulcus serpens," or "buchstaben keratitis." Second, representative bodies, or an international congress, can take up this matter and appoint a joint committee that will go over the list, choose the best name proposed for each condition and suggest a brief, simple scheme of classification. Science is classified knowledge, as contrasted with the chaos of knowing simply isolated or ungrouped facts. The difference is as great as between a library arranged and cataloged, and a junk shop piled with miscellaneous old books, pamphlets and journals. Practical knowledge is the arranged, related, classified knowledge.

In this classification of corneal diseases two possible bases for classification stand out clearly. *Etiology,* which implies course tendencies, prognosis, treatment, sequels; and *anatomic structures,* the epithelium, Bowman's membrane, the parenchyma, Descemet's membrane, endothelium, nerves, and lymph channels. Upon these must the classification be based. A possible outline of classification is given by Calhoun in six lines, on page 8. It ought not to be very difficult to arrange one, both simple and comprehensive; and then the practical gains to be effected thereby should rapidly bring it into general use.

E. J.

THE WASHINGTON CONGRESS, JOIN IT NOW.

Few American ophthalmologists have had the opportunity of attending an International Congress of Ophthalmology. The only one ever held in

America was the New York Congress of 1876, forty-five years ago. Of the eighty-nine members of that congress not more than five are now living. None of the congresses held in Europe has been attended by more than thirty ophthalmologists from this country. The way to hold such gatherings more frequently in the Western Hemisphere in the future, is to make the Washington Congress a strikingly successful one. Many of the papers offered for presentation and discussion have been prepared by some of the best known ophthalmologists in the world. The forty or thereabout, which will have a place in the presession volume and on the program, will furnish four days of scientific proceedings of very high interest. The demonstrations and the visiting of places of special interest in and near Washington, provided for in the arrangements for the Congress, will ensure the complete use of the time. But these arrangements can only be fully available for those who have previously made themselves familiar with the opportunities that the Congress will offer.

The annual gatherings of each of our National Societies are planned along much the same lines year after year; but this Congress will necessarily be arranged on a plan differing in many respects from such annual gatherings, and from earlier international congresses. Every member will be able to spend his visit to Washington more pleasantly and profitably if he goes there knowing as much of these plans as possible beforehand.

Manifestly the presession volume, the program and circulars of information, can be sent only to members of the Congress. General medical journals and even ophthalmic journals can give only a few general announcements regarding the things each member should know. The satisfaction of attending an annual meeting of the American Medical Association depends much on use of the special number of its Journal each year largely devoted to descriptions of the place and plans for the meeting. The Congress has no such widely circulated medium, thru which to inform those who hope to attend it, but have not become members.

Moreover the presession volume is now going to the printers. There is no way of knowing how many copies will be needed except by the number of those who have become members. It would be a poor way to use the money of those who have paid their dues, in printing volumes for those who have not given any indication that they will want them. The same is true of the program for the meeting, which will be a rather important publication, containing as it will an abstract of each paper in all the official languages of the Congress: French, Spanish and English.

Information will be desired as to reduced railroad rates and hotel accommodations. This can be furnished promptly and directly only to those who have joined the Congress. On every account if you are interested in the meeting send in your application and membership fee, to the Chairman of the Membership Committee, Dr. Walter R. Parker, David Whitney Building, Detroit, Michigan, *at once*. Even if you cannot attend the Congress you will be glad to have the record of its proceedings for reference in years to come.

The success of the Congress is now assured; its present list of members, about 800, assures a gathering of ophthalmologists much larger than any that has ever assembled in the past. But unless this list is again more than doubled, the meeting will not have done all that might have been done for ophthalmology in America.

E. J.

BUTYN A NEW LOCAL ANESTHETIC.

In September, 1884, Carl Koller, then a resident of Vienna, but for 33 years practising in New York City, announced in a paper read before the Heidelberg Congress by Brettauer, the discovery of the anesthesia produced by the local application of cocain to the conjunctiva. Ever since that time the search for other substances equally efficient as local anesthetics has gone on. Several valuable local anesthetics

have been discovered; but except for injection in large doses into the tissues, and for corneal anesthesia when dilation of the pupil was especially undesirable, cocain has still been the general favorite. Procain (novocain) has proved safer for injection, and holocain is free from any practical objection on account of pupil dilatation.

The latest claimant, *Butyn* (with y sounded like i in tin), comes before the ophthalmic profession with its value approved by careful investigation. Its manufacturers submitted the claims made for it to the Council on Pharmacy of the American Medical Association, who found it to be a synthetic product having the constitution and properties claimed; and called to their aid the Committee on Local Anesthetics of the Section on Ophthalmology, to study its medical and anesthetic effects in clinical use.

The report of the Committee, published on page 56, shows that it is the most important rival to cocain that has yet appeared. It is superior to cocain in that it does not dilate the pupil. The fact that it is a synthetic avoids any danger of a scarcity thru cutting off of the supply of a raw drug. Its advantages are briefly set forth in the conclusions of the Committee on page 60. It is probably too soon to claim that Butyn is nonhabit forming, and the careful practitioner will not presume on the apparent advantage of its being less toxic. But the results of the careful investigation that has been going on for about a year, and the competent conservative character of the members of the Committee that reports upon it, fully justify its extended trial by all progressive ophthalmologists. E. J.

BOOK NOTICES.

L'Iris. Etude physiologique sur le pupille et ses centres moteurs. By **Dr. A. Magitot.** Ophthalmologist to the Paris Hospitals, Octavo 272 pages, 27 figures in black and in colors. Paris: Gaston Doin, 1921.

This monograph presents to its readers, directly and clearly so far as they are known, the facts regarding the physiology of the iris; its anatomy, especially that of its muscles; and the movements of the pupil, with the centers and tracts that control them.

It is divided into two parts. The five chapters of the first part are headed respectively: Anatomy of the Iris, The Innervation of the Iris; The Pupil and the Iris Movements; Pupillometers, and the Action of Collyria on the Pupil. Part two, in the first chapter deals with the reactions of the pupil related to the function of vision, the photomotor reflex and the reaction with accommodation and convergence. The second chapter takes up the reactions independent of the visual function, and ends with a résumé of the pupillary innervation. The pathologic reactions and the relations of the pupils are not discussed.

The way in which the various topics are handled may be illustrated by the discussion of the iris movements (Chap. III). After considering the vasomotor supply of the iris, its aspect during contraction or dilatation of the pupil, the musculature and the theory of inhibition, Magitot takes up the theory of antagonist muscles. He begins by giving the arguments and experiments against a dilatator muscle, and then marshals those that favor a dilatator muscle, including the experiments of various physiologists and his own repetition of those of Langley and Anderson. Then the arguments for and against the membrane of Henle as the possessor of this dilatator function are considered, and the possible function of the branching cells of the stroma, as urged by Munch and Lauber is noticed rather favorably. Other headings in this chapter are the sensibility to light of the iris muscle itself, the state of the pupil during sleep, during syncope, coma and after death.

The movements of the pupil and their significance have an extensive literature, yet many questions about them remain unanswered. This book by its clear review of what we can accept as known, and its fair presentation of opposing views, brings the reader to that border of our knowledge

that marks where fruitful investigation may begin; and in some things it indicates the directions that such investigations might take. A very interesting brief review of the comparative anatomy of the iris is given in the chapter on its anatomy. This is the more valuable because the structure of the iris in different animals varies widely from that of man, or even from that of closely related species; and much of the evidence regarding the iris function rests on experiments on the lower animals.

The book is furnished with an alphabetic index, as well as a table of contents. It is printed chiefly in large type, with medium sized type for notes, quotations, etc. The conspicuous headings and systematic arrangement make it easy to find anything that the work contains. The illustrations are chiefly diagrams that serve to clarify and abbreviate the text. E. J.

Government Ophthalmic Hospital, Madras. Report and Statistics for 1920. Major **R. E. Wright**, I.M.S., Acting Superintendent. Quarto, 16 pages. Madras. Printed by the Superintendent Government Press.

This pamphlet, issued "for official use only," contains some observations that are of wide interest to ophthalmologists. The difficulties overcome in this service are revealed in this sentence: "As usual it was not found possible to limit admission to the number of beds available. The surplus sick were accommodated in the verandahs." The extent of this practice appears in the tabulated statistics. The number of beds was 170, the average daily sick 264; and one day the total rose to 300. The total number of "in patients" treated during the year was 3,797; the total of out patients was 20,138.

This large amount of clinical material is being utilized for teaching in the Elliot School of Ophthalmology, better than many large clinics in America. For the year reported upon, its opportunities were used by 81 medical students, graduate courses were taken by 20 civil assistant surgeons and 4 "overseas Doctors," from England, continental Europe, New Zealand and Australia.

An interesting change in the technic employed in this hospital is the use of a saturated watery solution of picric acid. Before the patient comes to the operating table, this is painted over the lids and brow; and after cleansing the conjunctiva with swabs of saline solution, a swab dipped in the picric acid solution is used to rub the lid margins. Instead of boiling the knives and needles, they are put in a special tray with the blades submerged in pure lysol. Immediately before use, they are rinsed in a wide mouthed jar of absolute alcohol, and wiped with a piece of sterile lint. In this way oxidization of the blades is avoided, and a larger number of operations can be done with a knife before discarding it.

It is instructive to note the experience with sclerocorneal trephining, in this hospital where Col. Elliot first brought the operation into general notice. It was done 237 times during the year. In 197 cases it was done for glaucoma, in 30 for staphyloma, in 7 for retinitis pigmentosa, once for occlusion of the central retinal artery, and once for detached retina. In the majority of glaucoma cases that come for operation in Madras, the sight has been lost. Thus 40 had no light perception and 19 had been unable to get about alone for over 3 months, of whom four got some improvement. Of 21 blind less than 3 months, three regained light perception.

Operative removal of the lacrimal sac was done 227 times. The external operation under local anesthesia is adhered to. It is quick, bloodless in the majority of cases and gives good results. The case for the external operation is considered proven until something faster, which gives better results as to subsequent lacrimation, is devised.

There were 52 cases of keratomalacia. The experiment of feeding the infants a mixture of milk fat, fresh fruit juice and yoke of egg, was tried; but gave no better results than the admin-

istration of cod liver oil. One case of quinin blindness is reported, in a boy of seven, who took 6 grains of quinin in 9 hours, and awoke blind the next morning. The eyes remained blind, pupils dilated and without response to light until 17 days, when paracentesis was done on each cornea. After 4 or 5 days light perception returned, and a month later vision in each eye was 5/15.

We know of no publication that gives in a few pages more of the really valuable results of careful clinical observation of eye diseases. If writers would generally keep in view the penetrating power of terse statement, the attractiveness of brevity, much would be read and remembered, that is now unnoticed or forgotten because hidden by the unimportant recitals in which it is buried. E. J.

The Evolution of Modern Medicine. Sir William Osler, Bart., M.D., F.R.S. Small quarto, 262 pages, 107 illustrations. New Haven, Yale University Press. 1921.

Every physician needs to read some books for their general cultural value, to broaden his outlook and help him keep out of ruts. Some would say the specialist has most need of this. The book before us is one of the kind best suited to meet this need. Its subject should be attractive to any member of the medical profession; it is approached from a broad outlook on both medicine and history; and the wise selection of matters to notice, and the clear, direct style of the writer make it very easy to follow and grasp the line of thought.

The book records in permanent form six lectures delivered at Yale University, and the Silliman Foundation, in April, 1913. The Silliman Foundation was established in 1883, and this appears to be the fifteenth series of such lectures thus far published. Those by Sherrington on the Nervous System, Bateson on Problems of Genetics, Verworn on Irritability, and Haldane on Respiration (two series) are those most closely related to medicine; the others dealing with various phases of science and history.

The manner in which the subject of the lectures is presented is indicated by the chapter headings, which are:

I. Introduction, which deals with the origin of medicine, Egyptian Medicine, Assyrian and Babylonian Medicine, Hebrew Medicine, and Chinese and Japanese Medicine.

II. Greek Medicine; subdivided under these headings: Asklepios, Hippocrates and the Hippocratic writings, the Alexandrian School and Galen.

III. Mediaeval Medicine: The South Italian School, Arabian Medicine, the Rise of Universities, Mediaeval Medical Studies, Mediaeval Practice, and Astrology and Divination.

IV. The Renaissance and the Rise of Anatomy and Physiology, including Paracelsus, Vesalius and Harvey.

V. The Rise and Development of Modern Medicine, ranging from Boyle and Morgagni to Internal Secretions, with a page on the Development of Chemistry.

VI. The Rise of Preventive Medicine; with subheadings on Sanitation and Tuberculosis.

The references to the eye and its diseases are not numerous, the fees and penalties for operations on it in the code of Hammurabi, the eye of Hotep in Egypt, the evil eye, and a few others. But there is no attempt to trace the development of ophthalmology as a special branch of medicine.

The illustrations add greatly to the value and interest of the work. Their subjects vary widely as the Code of Hammurabi, Chinese acupuncture diagrams, four photographs of the statues of Asklepios and Hygieia, the landscapes showing the layout of Epidarus and the Asklepieion at Cos, the bust of Hippocrates and the earliest known manuscript of his works. There are portraits of leaders in medicine from Avicenna to Lord Lister, title pages and other pages of famous books, Vesalius' pictures of anatomy, Harvey's illustrations of his experiments, the "hand of Sarah Nelmes inoculated with smallpox," and Robert Koch in

his laboratory. Many of these pictures occupy full pages; and they give a reality and vividness to the narrative that could otherwise be attained only by wide travel and years of study.

The student of the classics traces in the past the roots of our life of to-day. The scientist lays bare the eternal relations of orderly sequence, of cause and effect. Combining the two services, Osler has left in this volume a tribute to the memory of her for whom the Silliman foundation was named, a monument of his own wide culture and untiring industry, and an inspiration to his heirs and successors in medicine to travel the paths of unselfish service and bring forth permanent benefits to the race. E. J.

BIOGRAPHIC SKETCHES.

THOMAS H. SHASTID.

SUPERIOR, WISCONSIN.

GUSTAVUS ADOLPHUS ASCHMAN, of Wheeling, W. Va., died of chronic nephritis and uremia on Oct. 2, 1921. He was born in New York City in 1860, his parents being of Swiss descent. His father died while he was very young, and his mother took him to Switzerland to be educated. He received his medical degree at the University of Zurich, Switzerland, in 1884, and shortly afterward migrated to America. Settling at Wheeling, W. Va., he established an excellent practice. At the time of his death he was consulting ophthalmologist to the Ohio Valley General Hospital, at Wheeling. He was medium sized, but erect and fine looking. He always took a deep interest in public affairs, and many times addressed various civic bodies and fraternal organizations of Wheeling on public questions. In 1889 he was married to Miss Ida Harden, of Wheeling.

HEMAN HAMPTON BROWN, a well known ophthalmologist of Chicago, died at Orlando, Fla., on April 10, 1921. He was born at Williamsport, Penna., July 8, 1863, son of George R. and Elizabeth Brown. His medical degree was received at the University of Michigan, Ann Arbor, in 1886. He was formerly professor of ophthalmology in the Illinois Medical College, as well as president of that institution. He was also professor of ophthalmology in the Chicago Eye, Ear, Nose and Throat College, and consulting ophthalmologist to the Columbus Hospital. He was active in the Chicago Ophthalmological Society, and served as its President.

Dr. Brown married, Nov. 17, 1886, Miss Myrtie L. Poucher. To the union was born one child, now Mrs. Ernest Salmon. The Doctor was a man of medium size, with florid complexion, blue eyes and white hair. He was always gay and brisk in manner, a voluminous reader, a collector of rare books. He was public spirited and progressive.

JUSTIN LOWE JACKSON, a prominent ophthalmologist and otolaryngologist of Savannah, Ga., died on August 11, 1921, at a hospital in that city. He was born in 1875, received the degree of A.B. at Emory College, and, in 1902, the M.D. from the Atlanta Medical College. He served in Grady Hospital, Atlanta, and in St. Joseph's Hospital, Savannah, and after practicing general medicine for two years, took a course on ophthalmology and otolaryngology in New York. Since then he has practiced eye, ear, nose and throat diseases in Savannah. He was once president of the Georgia Medical Society.

WALTER LYTLE PYLE. The death of the distinguished Walter Lytle Pyle at Merion, Penna., on Oct. 8, 1921, came as a profound shock to American ophthalmologists. He was born, son of William J. and Sarah Lane Thomas, Pyle, at Philadelphia, on Dec. 20, 1871. Three degrees were received by him from the University of Pennsylvania: the A.B. in 1888, the honorary A.M. in 1893, and the M.D. in the last named year. Before engaging in practice, Dr. Pyle specialized on ophthalmology, studying at Washington, London, and Paris. Returning, he practiced ophthalmology in Philadelphia until his death.

He was, for a time, clinical assistant at the Polyclinic, also clinical assistant, later assistant surgeon, to the Wills Eye Hospital. At the time of his death, and for some years prior thereto, he was ophthalmic surgeon to the Mount Sinai Hospital. He was a member of the College of Physicians of Philadelphia, of the Pennsylvania State Medical Society (sometime Assistant Secretary), a fellow of the American Academy of Medicine (sometime Assistant Secretary), a member of the American Medical Association (active in the Section on Ophthalmology), and a member of the American Ophthalmological Society.

In 1898 he was editor of "The International Medical Magazine"; from 1902-05 editor Department of Ophthalmology of "American Medicine"; from 1903-05 editor Section on Ophthalmology, "American Year-Book of Medicine and Surgery." He was also editor, as well as part author, of the well known "International Series of Hand-Books on Ophthalmic Practice," published by P. Blakiston's Son & Co., and still incomplete. The Doctor established a very large practice, and was widely known as an operator, more widely still, however, as a writer both on diseases of the eye and on medicine generally. All his writings bear the impress of deep sincerity and untiring scholarship.

Walter Lytle Pyle, 1871-1921.

Dr. Pyle was a large, stout man, smooth faced, of an olive complexion, brown eyes and black hair. He was always brisk, cheerful, friendly, and, as an old time acquaintance of his expresses it, "exuded vitality at every pore." He was a Member of the Sons of the Revolution, of the Union League and of the Medical and Art Clubs, and the Merion Cricket Club. On April 11, 1898, he married Miss Adelaide Besson, by whom he had two children, Sarah Adelaide and Walter Lytle.

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Wernicke, O. New Theory of Keratoconus—La Semana Medica, no. 24, 1921.

The etiology of keratoconus is entirely unknown, due primarily to the rarity of pathologic examinations and the monosymptomatic character of the disease, which is confined to one tissue—the cornea. Keratoconus being generally binocular is most probably due to a general diseased condition of the connective tissue, which is not confined to the eye, but may extend to other regions. We do not recognize these lesions because they produce small foci; and only when the connective tissue performs a delicate function, as in the cornea, are we able to visualize its effects.

Changes in the connective tissue of the whole body have been detected in different processes. What is known as "blue sclera," otosclerosis, the lack of resistance to fractures, luxations, etc., are primarily due to lack of resistance of this tissue.

There is a disease of the nervous system: multiple sclerosis, in which the changes are localized in the beginning, in the glia tissue, which altho different from the connective tissue, plays in regard to the nervous structures the same supporting role as the former.

The author believes that keratoconus represents only a plaque of sclerosis occurring in the cornea, and possibly existing also undetected in other parts of the body. Both conditions have in common the presence of pigment in the periphery of the cornea. The pigmentation of this membrane in patients suffering from multiple sclerosis has been described by Kyser in 1902, and later by Fleischer and others. In keratoconus a ring of pigment appears in the periphery and is considered by some authors as diagnostic of this condition.

Multiple sclerosis is due to a spirochete which it would be necessary to look for in the corneal tissue in order to corroborate the theory. This

spirochete is different from the one found in syphilitic tissues.

M. U. T.

Goldschmidt, M. Contribution to the Pharmacology of Optochin. Graefe's, Arch. f. Ophthal. 105 Band, Festschrift fuer E. Fuchs, p. 456.

Goldschmidt recalls a former communication, in which he showed that in the treatment of ulcus serpens with optochin hydrochlorid the rapidity of the diffusion of the latter thru the cornea must be considered.

He also calls attention to the retarding action of optochin, which in certain concentrations has a reversible action. He made a number of experiments on guinea pigs, which prove that solutions of optochin of 1.25 to 0.08% have a distinct retarding action on the regeneration of the epithelium, while concentrations of 0.04 to 0.01% are practically without influence on the process of regeneration. His experiment with the 1.25 to 0.63% solutions on the cornea of the guinea pigs also showed, besides retardation of regeneration, injurious effects upon the epithelium and parenchyma. Further examination on the resorbtion of hypopyon proved to his satisfaction that this is a process of autolysis. Solutions of optochin of 2 to 0.4% strongly retard, while solutions of 0.25 to 0.13% accelerate the autolysis.

This paradoxic action of optochin is well known in the case of quinin, and corresponds to the well known biologic law that solutions, which in certain concentrations retard an action, will accelerate the action when much diluted.

H. A.

Kooy, J. M. Prowazek and Other Forms of Cell Inclusions in Trachoma Patients. Doctorate Thesis, 1919. Amsterdam.

Johanna Marie Kooy gives a detailed description of the different forms of cell inclusions, which have been found since Prowazek and Halberstaedter published their findings in 1907. She also tried to cultivate some microorganisms. Seventy cases are reported in abstract, and she comes to the following conclusions:

It was possible in nearly all cases (69 out of 70) to make the diagnosis of trachoma from the slide of conjunctival secretion and epithelial cells, by demonstrating the different forms of a polymorphous microorganism. The clinical course was in agreement with this diagnosis. Intensive treatment, as with 2% silver nitrat, 2% ichtargan, and pressing out the follicles made some forms of the microorganisms disappear quickly, namely the larger intracellular initial forms. The intracellular elementary bodies were the most obstinate to treatment. Trachoma in the cicatricial stage could still be dangerous with such forms present.

The different forms were variously present in patients from different parts of the city. A polymorphous microorganism could be cultivated from five cases, which would produce all forms as found in the slides. One could even observe that one form produced the other. The forms had similarity with those described in scarlet fever, variola, vaccinia and jaundice of the silk worm. The microorganism is facultatively anaerobic, grows very slowly. Growth was demonstrated by transinoculation with the solid ascites medium, on which the microorganism appeared two to seven days later. As a rule it is not resistant to 10% taurocholic acid. It closely resembles that described by Noguchi and Cohen in 1915. It is resistant against drying during half an hour at 32 degrees, and heating during one hour at 45 degrees in ascites fluid. It is killed by heating at 50 degrees.

E. E. B.

Bonnefon. Circulation in Choroid and Ciliary Body in Relation to Ophthalmotonus and Secretion of Aqueous. Ann. d'Ocul. v. 157, p. 504.

The facts quoted seem to prove that the choroid, instead of being an erectile or turgescent tissue, is in reality a venous reservoir with a very sluggish circulation. The vortex veins are

usually compressed by the intraocular tension, which their internal pressure cannot overcome. The capillary tension of about 60 mm. is almost completely absorbed by the choroidal plexus, for the pressure in the efferent veins is only 8 mm.

The tensor muscle of the choroid fastens the choroid to the vitreous body, and thus removes, partially, the superficial layers from the action of the intraocular tension, when it contracts. The ciliary contractility, whose normal play implies the perfect elasticity of the ocular membranes, is the dynamic agent of the choroidal circulation. When the muscle acts, the venae vorticosae dilate, resulting in an afflux of blood which empties thru the perforating veins. To this corresponds a delay in the ciliary circulation due to the profuse anastomosis. The vortex veins thus act as valves, maintaining a constant pressure in the ciliary body, and influencing thereby the formation of the aqueous by the latter.

C. L.

Leplat, G. Arterial Pressure in Vessels of Iris. Its Modification Under Collyria. Ann. d'Ocul. v. 157, p. 693-701.

The arteries in the iris of the dog are visible to the naked eye, and under weak magnification the amplitude of their pulsation can be noticed. They are therefore well adapted for the solution of the above problem. The author found that there was an arterial pulsation in the presence of the normal ocular tension. This pulsation is increased under the influence of a weight of 30 to 45 on the dynamometer, but is abolished when the weight reaches 75 to 90. This, however, is only temporary, and to abolish it permanently, a weight of 100 to 115 is necessary. Testing with collyria, it was found that atropin distinctly increased the tension in the iridal arteries, and that cocain has a similar effect, tho less pronounced. Pilocarpin and eserin act as vasoconstrictors, producing a secondary arterial hypertension. Altho the ocular tension falls, there is only a slight variation in the arterial tension. Dionin (2.5%) had no influence on either arterial or ocular tension. Adrenalin increases both ophthalmotonus and arterial tension, the latter to a much greater degree.

C. L.

Behr, C. Hereditary Degeneration of Macula. Klin. M. f. Augenh. v. 65, p. 465.

The degeneration of the macula may also appear as a decidedly hereditary disease of typical aspect, characterized by the following qualities: 1. The disease is a family affection or hereditary. 2. The changes are almost always bilateral and of great similarity in both eyes. 3. Certain family types exist which recur in the affected members in almost photographic identity. The family type is characterized by the onset and the course of the affection. Usually it begins in the border years of the different periods of growth: as congenital affection at the transition of the intrauterine to extrauterine life; from the 6th to 8th years, at the commencement of the 2nd dentition; around the 14th year at the beginning of sexual maturity; in the early twenties at the completion of growth of the skeleton and sexual maturity; around the 50th year, the beginning of senile involution, and finally senilism, (Behr considers the senile macula degeneration of Haab identical with the heredodegeneration), as premature sign of approaching death. Most cases belong to the infantile and juvenile types.

The affection is either slowly progressive, without leading to complete amaurosis as long as there are no complications, or is spontaneously arrested after some time. In these cases the functional disturbances (diminished central vision, small relative scotomas) may improve. The time of occurrence and character of course in each family are always exactly alike. The heredodegeneration of the macula occurs either in different children of the same family without affected ascendency as collateral latent hereditary transmission, or directly or indirectly from one

generation to the following. The transmitting women as a rule are themselves affected, whereas the transmitting men have been intact. It often is combined with other hereditary diseases of the nervous optical apparatus. Those complications are not subject to the rigid hereditary law of degeneration of the macula. There is no family type as the complications may affect only some members, or are not homogeneous disturbances of the color sense (red-green weakness, Daltonism, Daltonism with participation of the yellow-blue sensation, and total color blindness are the most frequent). In others partial or total optic atrophy, a disease similar to retinitis pigmentosa, and honeycombed chodoiditis of the extramacular retina are encountered. All these have nothing to do with the heredodegeneration, and are independent parallel hereditary complications indicating a great extension of degeneration tendency of the parental germ plasm. But not every degeneration combined with heredodegeneration of the macula is hereditary.

Behr reports the clinical histories of a number of families, illustrating the different types. Ophthalmoscopically the focus has the shape of a disc or a horizontal oval of rather sharp outlines, surrounded by a concentric zone of more intensive pigmentation. It has the size of from 1/2 to 1 disc diameters, in one case 5, is of yellowish brownish red color, not uniform, but spotted and contains dots or lumps of pigment, sometimes glistening white dots. The fovealar reflex disappears early, the macular reflex may be preserved for a long time. In one case the focus looked very like a coloboma.

C. Z.

LeBoucq. Circulation in the Aqueous Humor. Royal Academy of Belgium. Oct. 30, 1921.

In a new work on the circulation of ocular fluids, le Boucq seeks to demonstrate the existence of a current in the anterior chamber. He has studied the composition of the aqueous humor and the conditions of its formation, and he points out the changes in it following inflammation. He finds a preeminent proof for the existence of a liquid current in the ease with which the composition of the aqueous humor varies. Le Boucq refers to injections or fluorescin and their appearance in the anterior chamber, following ligature of the lymph duct of the neck in a rabbit. This resulted in myosis of the ligated side; and the appearance of the fluorescin was more diffuse on the side not ligated. Le Boucq thinks that circulation of the aqueous humor is controlled by the sympathetic.

M. Danis.

Holland. Eye Operations Performed at Shikarpur, Sind, in Jan. and Feb., 1921. *Indian Medical Gazette,* Vol. LVI, p. 212, June, 1921.

This is the eleventh year Dr. Holland has visited Shikarpur and the figures show the same huge amount of work as in previous years. On 29 operating days, 2412 eye operations (besides 185 general operations) were performed.

The chief operations were cataract 1203, iridectomy 253, pterygium 117, entropion and trichiasis 296, evisceration 25, excision of lacrimal sac 6, probing 23.

Ninety-five per cent of the cataracts were expressed in the capsule, capsulotomy being done "in all cases in which the lens does not present well," in traumatic and congenital cataracts, and in some cases of high tension. In the 1203 cases were nine cases of sepsis, 0.75%, and eight cases of choroidal hemorrhage, probably from high tension. It would have been interesting to know the methods adopted for the prevention of sepsis.

After results of trephinings and Herbert's operations, done in previous years, were seen and found satisfactory. Where iridectomy had been done in one eye and trephining in the other, the latter showed the better result.

Subjunctival injections of saline were made in 193 cases of pannus, 59 of trachoma and 52 of recent corneal opacity and corneal ulcers. In phylctenular ulcers they acted like a charm, also in superficial leucomata of not

more than three months duration. Dr. Holland has given up using cyanid of mercury injections as being much more painful and no more successful. The strength of the saline injected is not stated. Trachoma was also treated —in mild cases—by the application of 1 in 100 corrosive sublimat. Severe cases were scraped by a sharp spoon before the application.

The staff was small. It included six doctors in all, never more than three at once. Among them was Dr. Martin of the American Presbyterian Mission. F. P. M.

Rush, Calvin C. Treatment of Trachoma. China Medical Journal, vol. xxxv, no. 3, May, 1921, p. 211.

Rush emphasizes the difficulty of recognizing the early stages of trachoma, "the foremost cause of blindness in China," from simple folliculosis or follicular conjunctivitis. He thinks it possible that conjunctival granulations may be the result of "too much sun," since many of the Chinese wear no hats at all. "The sunlight, by keeping the eyelids in a state of chronic irritation, probably makes the conjunctiva more susceptible to the trachoma infection. This gives the first indication for treatment—that a hat with a good brim be worn."

Rush generally uses the copper sulphat stick, especially in pannus cases, until the granules are no longer visible, and then uses daily glycerit of boroglycerin, which he says should be made strictly in accord with the directions of the pharmacopeia.

For a change of treatment he suggests rubbing the diseased lids with applicators dipped first in $HgCl_2$ (1-500) and then in powdered boric acid.

In corneal involvement, atropin and yellow oxid of mercury ointment are used. In cases of purulent discharge he applies silver nitrat 2% sol., or argyrol 25% sol., which should be made up freshly each week. In certain cases expression of the follicles gives splendid results.

For home treatment he relies upon zinc sulphat, boric acid and normal salt solutions. H. J. H.

Denhaene. Ocular Lesions Caused by Asphyxiating Gases. Congres Internat. de Med. Milit. July 15, 1921.

In spite of the pessimist previsions at the beginning of their use, the war gases have provoked but slight ocular lesions compared with the damage caused to other organs.

The ocular lesions are generally limited to some light specks on the cornea and even these are rare, according to the majority of authors. We must accept only with reserve the assertion of those who impute to the poison gases the ocular lesions of which they avail themselves in order to obtain a disablement pension.

Without rejecting absolutely the possibility of incurable chorioretinal lesions, the action of the vesicant gases on the posterior segment of the eyeball is limited to a venous congestion of the deep membranes, and yet the latter is met with only in the severe poisonings of the whole organism.

As regards the blepharoconjunctivitis, secondary to the gas injuries, this is curable by an adequate and more or less long treatment, and consequently does not entitle to a percentage of disablement. M. D.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn. Volunteers are needed in other localities.

DEATHS.

Dr. E. R. Schneider, a well known Danish ophthalmologist, died recently.

Mrs. Greenwood, wife of Dr. Allen Greenwood, of Boston, died very suddenly on September 26th, 1921.

Dr. William H. Fox, Washington, D. C., aged sixty-four, died November third. He was a member of the American Ophthalmological Society and a former surgeon to the Episcopal Eye and Ear Hospital.

Dr. F. P. Maynard, lieutenant-colonel, Bengal Medical Service, retired; former professor of ophthalmology, Medical College of Calcutta, India, died from pneumonia, September 20th, at his home in England.

PERSONALS.

Dr. Myles Standish, of Boston, has resumed practice after a month's indisposition.

Dr. L. Webster Fox spent the Christmas holidays at Port Sewell, Florida.

Dr. Ruth Alexander has opened an office in the Alexander Young Building, Honolulu, and limited her practice to eye, ear, nose and throat.

Drs. L. E. Brown and T. H. Cook of Akron, Ohio, have taken offices in the Second National Bank Building.

Dr. Alexander Duane, of New York City, delivered an address on "The Hour of Vision," before the University Club, of Baltimore, October 21, 1921.

Dr. John M. Wheeler has been elected Chairman of the Section of Ophthalmology of the New York Academy of Medicine, and Dr. Ben Witt Key, Secretary.

Dr. W. B. Banister, brother of Dr. John M. Banister of Omaha, Nebraska, is spending a few days in Honolulu on his journey from Manila to the States.

Walter H. Kiep has been appointed professor of ophthalmology in the Cairo Medical College, with charge of the ophthalmologic clinic at Kasr-el-Ainy Hospital.

At the Centenary Reunion of McGill University, held in Montreal last October, two ophthalmologists were given the degree of L.L.D. They were Mr. J. B. Lawford of London, England, and Dr. Casey A. Wood of Chicago.

Dr. Hans Barkan spent the Christmas holidays with his father, Dr. A. Barkan, of Switzerland, formerly of San Francisco. Dr. Barkan will spend several months in the clinical centers of Europe before returning to San Francisco.

Mr. Lewis H. Carris, Washington, D. C., who has been engaged in government vocational educational work, has been appointed field secretary for the National Committee for the Prevention of Blindness.

Professor Fuchs, of Vienna, gave a course in Boston, arrangements for which were made by the New England Ophthalmological Society. The men who attended found the course most interesting and instructive.

At the November meeting of the New England Ophthalmological Society Dr. Snell, of Rochester, New York, gave the substance of the report of the A. M. A. Committee on "Compensation for Ocular Injuries."

Dr. Harold Gifford and Dr. Casey Wood are visiting British Guiana again this winter, and will journey into the interior to see the Kaietur Falls. The latter has been in Barbados collecting material for a proposed work on the Eyes and Eyesight of Birds. Dr. Wood has been recently elected a Life Member of the American Ornithologists' Union.

On November 4th, 1921, Dr. Van Der Hoeve, of Leiden, Holland, gave a most interesting illustrated talk on "The Optic Nerve and Sinus Diseases" before the New England Ophthalmological Society and the New England Otological and Laryngological Society.

Dr. Gilbert E. Seaman has purchased the three story residence, corner Mason and Cass Streets, Milwaukee, and will convert the building into offices and an infirmary of twenty beds for eye, ear, nose and throat cases. Dr. Seaman has associated with him Dr. Thomas Tolan, recently of the University of Michigan.

Dr. George H. Kress, of Los Angeles, called on us, in Denver, a few days ago, on his way home from a nine months' trip to Vienna. He will write something for publication very shortly, giving us the benefit of his experiences there. It appears that the clustering together of the Vienna clinics is a distinct advantage when compared with the scattered clinics which obtain in almost every other city in the world.

SOCIETIES.

The January meeting of the Kansas City Eye, Ear, Nose and Throat Society was held in St. Joseph, Missouri.

The next meeting of the Academy of Ophthalmology and Oto-Laryngology will be held September 19-23, at Minneapolis. The Academy will be entertained by the Minneapolis Academy of Ophthalmology and Oto-Laryngology, and the meetings will be held on the campus of the University of Minnesota.

At the annual election of the Louisville Eye and Ear Society on December 9th, the following officers were elected for the ensuing year: President, Dr. George Robertson; vice-president, Dr. J. H. Simpson; secretary and treasurer, Dr. Gaylord Hall. Dr. Max A. Goldstein, of St. Louis, was the guest of the Society in January.

At the January meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, Dr. Hiram Woods, of Baltimore, by invitation read a paper on "Impressions from Eye Examinations in Real or Supposed Psycho-Neurotics." This paper was discussed by Dr. G. E. de Schweinitz, Dr. F. X. Dercum, Dr. A. C. Buckley, and others.

MISCELLANEOUS.

Cornell University Medical College is to open a model pay clinic. It will hold clinics daily and two evenings each week. The fees will be one dollar for each visit and examination. Dr. Lewis Gregory Cole is to have charge of the opthalmologic clinic.

The Council of British Ophthalmologists has rendered the opinion that the medical service of the police force and that of the postal service, cannot be adequate unless it includes the services of ophthalmic surgeons to whom recruits and employés can be referred for expert opinion.

An arrangement has been perfected by the American Academy of Ophthalmology and Oto-Laryngology with the Army Medical Museum, whereby the latter is to set apart space for the display of specimens, and to coöperate by reports to donors of specimens with photographs of gross specimens and microscopic slides. All ophthalmologists are urged to send specimens for this collection. They will be available for study by physicians, and the Museum will prepare a pathologic exhibit for each meeting of the Academy. Specimens should be sent in wide mouthed bottles. First a layer of cotton in bottom of bottle, then the specimen, then more cotton, when the bottle is filled with a 10 percent solution of formaldehyd and allowed to stand twenty-four hours. The fluid is then drained off, the bottle tightly corked and mailed to the Section on Ophthalmologic and Oto-Laryngologic Pathology of the Army Medical Museum, Washington, D. C. A clinical record of the case should accompany the specimen. The Committee is preparing a file of lantern slides, charts, moving pictures, etc., used in the courses given by the Academy, and this material will be used by members for teaching purposes. The committee in charge consists of Major George C. Callender, Washington, D. C., and Drs. Harry Gradle and Ira Frank, Chicago.

Mr. William A. Hadley, of Winnetka, a suburb of Chicago, was a High School teacher for sixteen years, until he lost his sight six years ago, and was forced to retire on a modest income. He conceived the idea of teaching the blind by correspondence. At the present time he has nearly ninety blind students, scattered from Shanghai to Boston, with whom he corresponds, correcting their papers, giving them their new lessons with the aid of a Braille typewriter. The citizens of the town recently gave an entertainment for the purpose of raising funds to purchase a printing press, for paying the wages of a stenographer, and for securing additional equipment for his magnificent work.

Investigations which have been in progress in regard to trachoma conditions in Southern Illinois, reveal the startling fact that in one county, during a period of ten years, one out of every three families sent a charity patient suffering from trachoma a journey of 200 miles for treatment at the Illinois Charitable Eye and Ear Infirmary in Chicago. In another county one-eleventh of the entire county budget has been used for pensions for the blind, two-thirds of whom are blind from trachoma.

It is an interesting fact that the foreigners in these mining sections of the state have much less trachoma than the native American population. In one town of 11,000, 40 percent are foreign. Examination of the eyes of all the school children of this town revealed the fact that 92 percent of the trachoma cases were children of American born parents.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given ni English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

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PRECHIASMAL INTRACRANIAL TUMORS OF THE OPTIC NERVES.

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This paper gives a general discussion of prechiasmal tumors of the optic nerve; and reports two cases with the pathologic findings, and the conclusions drawn from the author's experience. The detection of this lesion is the direct outcome of an address delivered before the Hartford (Conn.) Academy of Medicine, on the diagnosis and localization of brain tumors. Dr. F. L. Waite and Dr. E. Terry Smith, who had been attending these patients, then suggested the possibility of an intracranial tumor. From the Department of Surgery, of the Johns Hopkins Hospital and University.

The two cases which form the basis of this paper are presented because I believe they represent a type of lesion which may be responsible for many cases of unexplained blindness, and because with proper treatment of the cause, the vision may be more or less completely restored. The lesion in question is an intracranial tumor involving the prechiasmal segment of the optic nerves in the neighborhood of the optic foramina. Postmortem records establish a group of cases fundamentally similar, but I have found no record of the clinical diagnosis of such a lesion and none, therefore, in which such a tumor has been treated surgically. There is a very definite and important pathologic relationship between these tumors and those of the intraorbital division of the optic nerve. This relationship, long obscured by the paucity of postmortem examinations and the proper correlation of those which had been made, now becomes of the greatest practical concern in all tumors involving the optic nerve, for not only does the eyesight but quite frequently the life of the patient depend upon a correct diagnosis and adequate surgical treatment.

The diagnosis of a prechiasmal tumor of the optic nerve is at present none too sharp and at best there is an element of uncertainty, but the early stage at which the diagnosis of these first cases has been made, encourages the hope that the history and the signs, altho few, may be sufficiently definite to lead to the recognition of the lesion with greater precision, and before the advent of those late and hopeless manifestations which indicate the spread of the tumor either into the orbital cavity or into the brain. In the two cases which are presented here, the tumors were so small and so precisely confined to the optic nerve, that the location of the growth was not betrayed by any signs of intracranial pressure or by involvement of the optic chiasm thru extension of the growth posteriorly, or by exophthalmos from its extension anteriorly. In one case, the clinical picture was that of gradual blindness, and nothing else; not even was there a suggestion, either by signs or symptoms, that an intracranial lesion was present: in the other, there were superimposed features which conformed to no recognized lesion but which, in general, indicated an intracranial disturbance. In one case, the vision returned from blindness to normal in less than two weeks after the operation; in the other, there was considerable return of sight after a partial removal of the tumor.

The presentation of a definite pathology for a group of cases of blindness of obscure origin, is particularly pertinent at this time when the literature is surfeited with articles on "optic neuritis." It is not to be inferred from this statement that I look upon optic neuritis as the false conception which has been claimed in rather heated discussion by very able authorities. The

existence of this clinical entity is undoubted. It is backed by evidence too conclusive. I have had several instances in which the optic neuritis has been substantiated by pathologic proof. However, as is true in all new discoveries, it is most unfortunate that such extravagant claims are made upon very hasty and fallacious observations and accompanied by no objective demonstration of pathology—opinions, on the whole, dominated by an over zealous personal equation. Eventually, of course, optic neuritis will settle down to a concrete clinical entity with a well defined pathologic basis, but until then patients innumerable are doomed to useless, dangerous, even fatal rhinologic operations, and many are sidetracked from the detection of the real cause of their ailment until the lesion has grown beyond the pale of operative assistance. As long as optic neuritis remains a diagnosis of exclusion, as it is so largely at the present time, this exclusion demands the collaboration of experts who are thoroly competent to exclude. Intracranial tumors have too frequently been missed by over zealous enthusiasts searching for optic neuritis. Over eager neurologic surgeons, also, are by no means blameless, for too many cases of optic neuritis have been subjected to needless cranial surgery, under the impression that a brain tumor existed. But on both sides the fault lies with the individual. Our means of diagnosis, tho still far from what they should be, are nevertheless adequate to eliminate all but the exceptional cases from these errors.

The differentiation between a mechanical swelling of the optic disc—"choked disc"—and an inflammatory swelling of the disc—optic neuritis—is only too frequently impossible by ophthalmologic examination. But what information is lacking with the ophthalmoscope, can usually be compensated by a careful history and by other examinations. At times, of course, the differentiation between an optic neuritis and a brain tumor may not be easy, but it should always be possible and without risk to the patient. Speaking from the standpoint of a neurologic surgeon, I can say that any brain tumor which can cause a choked disc can be accurately diagnosed and precisely localized; and conversely, it can be told with equal accuracy when a tumor is not present.[1] And, I believe, infec-

Fig. 1.—Photograph of patient 2 weeks after removal of right prechiasmal tumor. Note the slight divergence of the eyes; this has been present for several years.

tions of the nasal sinuses can also be detected or eliminated with a high degree of accuracy without resorting to rather blind exploratory operations on the paranasal sinuses. There is, therefore, little excuse in confusing these lesions. The mistakes are made by those who are not thoroly competent to pass upon intracranial or rhinologic conditions. The differential diagnosis between a prechiasmal tumor and an optic neuritis will be considered later.

CASES.

The history and operative findings on the two tumors of intracranial portion of the optic nerve are as follows:

Case 1. Mary C., referred by Dr. F. L. Waite of Hartford, Conn., is a very bright and physically normal girl of 13. (Fig. 1.) When 7 years old, or 6 years before admission to the Johns Hopkins Hospital, she had a spell of vomiting lasting a week. There was

no associated abdominal pain or other disturbance which should accompany an acute abdominal ailment; but during this period of vomiting, diplopia this time, dimness of vision first appeared in the right eye. There was no pain or aching in the eyeball and none referred elsewhere. Little fur-

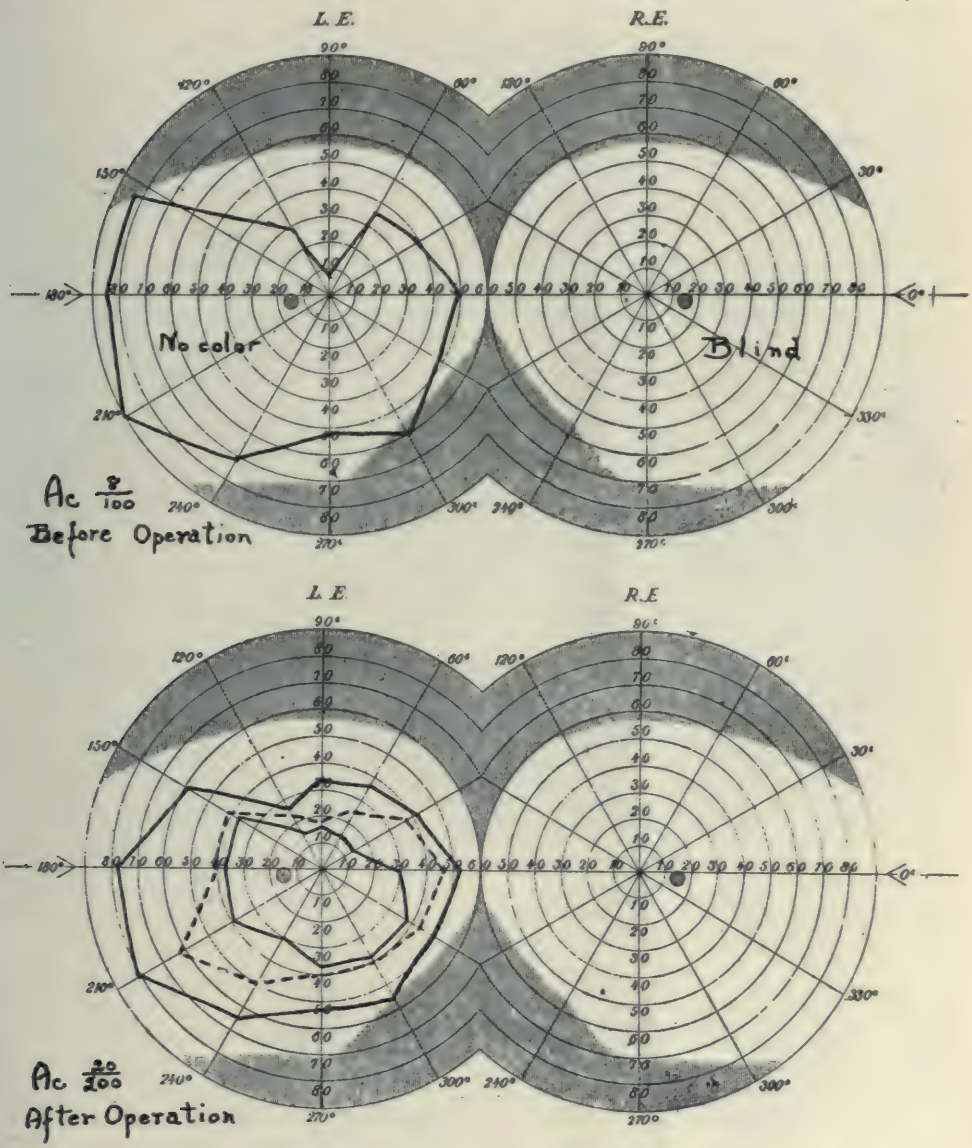

Fig. 2.—Visual fields of patients before and after removal of tumor.

developed and the left eye turned distinctly outward, demonstrating the intracranial origin of the vomiting. There was no headache associated with the attack. Within a week the crossed eye had returned to normal. About ther change developed until 3 years ago, when, during a mild attack of influenza, another vomiting spell persisted for several days and again the right eye became crossed. The vision was then so much impaired that she had

to quit school. The crossed eye gradually returned to normal. During the past three years, there have been three additional attacks of vomiting, each lasting nearly a week, and at each time *both* eyes were crossed. Coincident with the strabismus there has been drooping of the upper eyelids—apparently bilateral. Altho some improvement in the strabismus has been noted following the subsidence of the vomiting, a more or less permanent weakness of the eye muscles has persisted and varied in intensity from time to time. During the past three attacks, there has been a little aching in the eyes, but this subsided with the disappearance of the vomiting. Exophthalmos has never been noticed in either eye.

The loss of vision has been very gradually progressive in both eyes, but more in the right. Dr. Waite's careful notes show that she was blind in the right eye at least 3 years ago—at which time she first consulted him. At that time (1918) the vision in the left eye was 20/60; failing gradually, it was 10/200 in March, 1920, and 8/200 in June, 1920, and was the same on admission to the Johns Hopkins Hospital (April, 1921). *Patient has never had a headache in her life* and, except for the loss of vision, would be "in fine shape."

Fig. 3.—X-ray photograph of Case 1. P probable pineal shadow which is exceedingly large. C large cisterna chiasmatis filled with air. (The shadows have been intensified.) S sella turcica, slightly larger than normal. Air-filled sulci are seen over the frontal region.

From the physical, neurologic and special examinations, the following positive and negative items are summarized:

1) The right eye is totally blind.

2) The visual field for form was preserved in the left eye, but was somewhat contracted; visual acuity—8/200; complete loss of color perception; no hemianopsia. (Fig. 2.)

3) Both optic discs have a brilliant atrophic pallor; the margins are sharply defined; the lamina cribrosa are very distinct; there is no choked disc and no change in the size or shape of the retinal vessels.

4) The right eye moves outward, inward and slightly downward, but not upward. The left eye moves laterally, slightly downward, not medially or upward. There is a slight but definite ptosis of both upper lids. Both pupils react fairly actively to light, directly and consensually.

5) There is an unusually large calcified shadow of the pineal body (roentgenogram). (Fig. 3.)

6) The sella turcica is slightly but distinctly enlarged; it is rather cone shaped with the base of the cone upward.

7) The size and position of the lateral ventricles are normal (pneumoventriculography). (Fig. 4.)

8) The examination of the cerebrospinal fluid was negative. The Wassermann reaction from both the blood and cerebrospinal fluid was negative.

Fig. 4.—Pneumoventriculogram of Case 1 to show the ventricles which are of normal shape, size and position. This precludes the possibility of a tumor of the pineal body.

9) The paranasal sinuses were entirely negative.

REASONING TOWARD A DIAGNOSIS.

Despite the absence of headache, there was reasonable certainty in the diagnosis of an intracranial lesion, because of the transient bilateral extraocular palsies which always accompanied the spells of periodic vomiting. The fleeting character of the ocular changes indicated a lesion which varied in size. An intracranial lesion giving such variable signs is most likely a cyst or some abnormal collection of cerebrospinal fluid. The progressive blindness extending over such a long period of time seemed to indicate a tumor. But where could there be a tumor which would produce bilateral palsies of all the extraocular muscles and at the same time a bilateral loss of vision approaching blindness and at the same time without hemianopsia? The large extraordinary

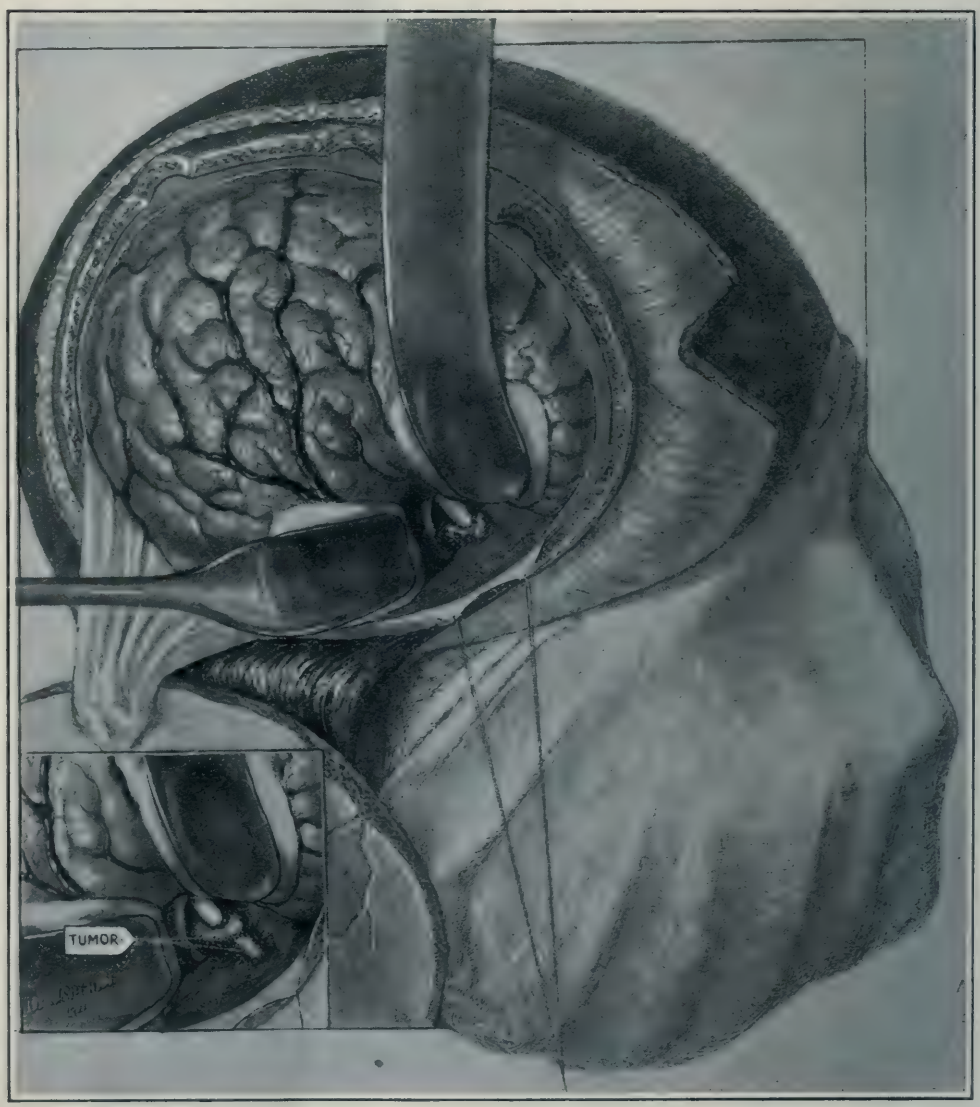

Fig. 5.—Showing operative exposure of prechiasmal tumor around the right optic nerve at the optic foramen. The carotid artery is shown just behind the optic nerve and the tumor lies between the optic nerve and the carotid artery. The insert shows the exposure of the tumor in the right optic foramen and in the right orbit after removal of a segment of the orbital roof.

shadow in the pineal region was suggestive of a tumor of the pineal body (Fig. 3), especially since a growth in this region would readily explain the bilateral changes in the eye muscles, and it could also explain the transient character of these disturbances. But a pineal tumor would cause blindness only if a hydrocephalus existed, for all pineal tumors produce symptoms of intracranial pressure only thru the secondary effects of hydrocephalus, which results from occlusion of the subjacent aqueduct of Sylvius. A choked disc and changes in the vessels of the retina would be expected, tho not necessarily demanded, of a pineal tumor which produced hydrocephalus; but a hydrocephalus was positively excluded by cerebral pneumography—the lateral ventricles being entirely normal. (Fig. 4.) If there was a pineal tumor, it certainly was not causing blindness and, for the same reasons, it was not causing the ptosis, for the nuclei of the third, fourth and sixth cranial nerves could be reached only after the aqueduct of Sylvius had first been compressed.

Could all the findings be explained by a tumor elsewhere? In only one other location could a growth give bilateral ptosis and extraocular palsies at the same time, i. e., in the region of the sphenoidal fissure, thru which the third, fourth and sixth nerves pass into the orbit. But a tumor in this region must be very wide to involve these nerves on *both* sides, so large in fact that intracranial pressure would certainly have existed. Moreover, the olfactory nerves should have been affected, but they were not. Such an hypothetically located tumor also made it difficult to explain the vision which was still present, for the optic nerves necessarily would have been in the center of a very large tumor mass. Moreover, the size of the sella was only slightly greater than normal; the posterior clinoid processes were not destroyed, so that the existence of a tumor of any size in this region was almost precluded; and if a pituitary

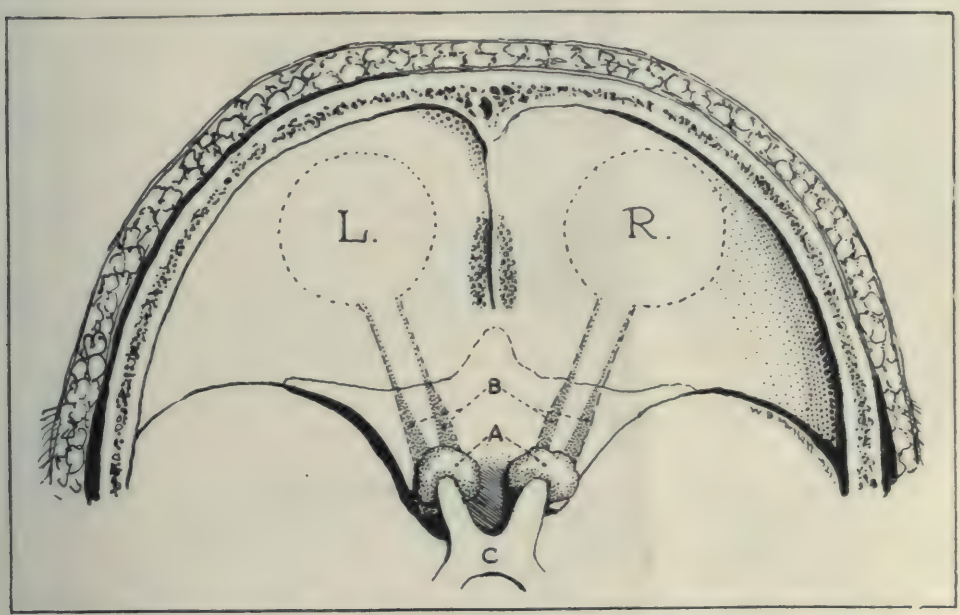

Fig. 6.—Diagram showing the position and size of the tumors of the optic nerve. Tumors are symmetric collar like growths surrounding each optic nerve at the optic foramen and passing forward into the orbit.

tumor should be present (almost an impossibility) why no evidences of hemianopsia?

The presence of a primary optic atrophy could not be questioned, therefore a tumor must be located somewhere along the optic nerves, and presumably between the optic foramina and the chiasm. Any form of toxic neuritis advancing so slowly and so progressively, seemed inconceivable; moreover, the paranasal sinuses were normal.

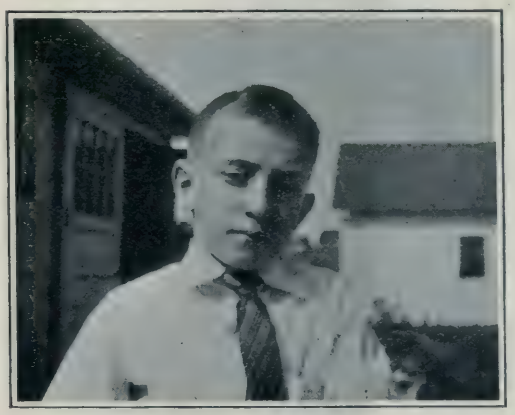

Fig. 7.—Photograph of second patient a month after the tumor on the left optic nerve was exposed by this intracranial approach. A palliative operation was done, incising a scar which bound the optic nerve to the tumor; this relieved the patient completely and restored his sight to normal.

At operation, two entirely independent tumors were found (Figs. 5 and 6), one completely surrounding each optic nerve at the optic foramen. The growths were small, almost perfectly symmetric, collar like growths. They were pale grayish pink, not unlike granulation tissue; the periphery of the growth was rather fluffy, much like seaweed, but toward the nerve it became quite firm. The entire diameter of each tumor including the optic nerve was about 1.5 cm.; posteriorly it extended along the nerve about 0.75 cm. and was very loosely attached except at the point where the dura is reflected. The tumor also grew thru the optic foramen into the orbit for a distance of about 1.5 cm., but it extended only as a linear strand in the orbit and did not surround the nerve. Here also it was merely adjacent to and not adherent to the nerve. The optic foramen did not seem enlarged. The intraorbital course and extent of the tumor on the left nerve could not be followed, for the orbital roof was not opened, but the intracranial appearance of the two tumors was practically identical. The tumor on each nerve arose from the dural sheath and in its slow fibrous growth had gradually constricted and strangled the optic nerve. The growths were not perfectly circular. Each budded externally as a small nubbin, and possibly may have abutted on the structures which passed thru the sphenoidal fissure, but this lateral extension was so tiny that such a nerve involvement was neither visible nor scarcely conceivable. The finding to which I am more inclined to attribute extraocular palsies is the big collection of fluid surrounding the tumor—undoubtedly a compensatory product which formed to protect the brain from this intrusive foreign mass. Nature has a well known method of surrounding the surface of many tumors with a bed of fluid which acts as a buffer between the neoplasm and the brain. All cerebello-pontine tumors are so covered. The principal reason for the belief that the pocket of fluid was responsible for the strabismus is that it was certainly responsible for the transient attacks which dated back several years, lasted only a few days and were always associated with vomiting. Palsies following the direct growth of the tumors would have persisted and increased and the growth was too gradual, and even in its final size too small, to have produced either the sudden transient disturbance or the permanent weakness of these muscles. The solid tumors were also far too small to produce vomiting or any signs of intracranial pressure. This collection of fluid was really an extension of the cisterna chiasmatis. (Fig. 3.) Another striking feature was the length of the optic nerves, a finding which one sees in all pituitary tumors when the chiasm has been lifted up and pushed backward, stretching the optic nerves as they grew; and in this particular instance the elongation of the optic nerves was possible only from the pocket of fluid, for the tumors extended less than half way between the optic

foramina and the optic chiasm. After the release of this big collection of fluid, the entire sella turcica and the suprasellar region could be readily inpressure of the abnormally large cisterna chiasmatis.

The gross appearance of the tumor at once suggested the typical dural

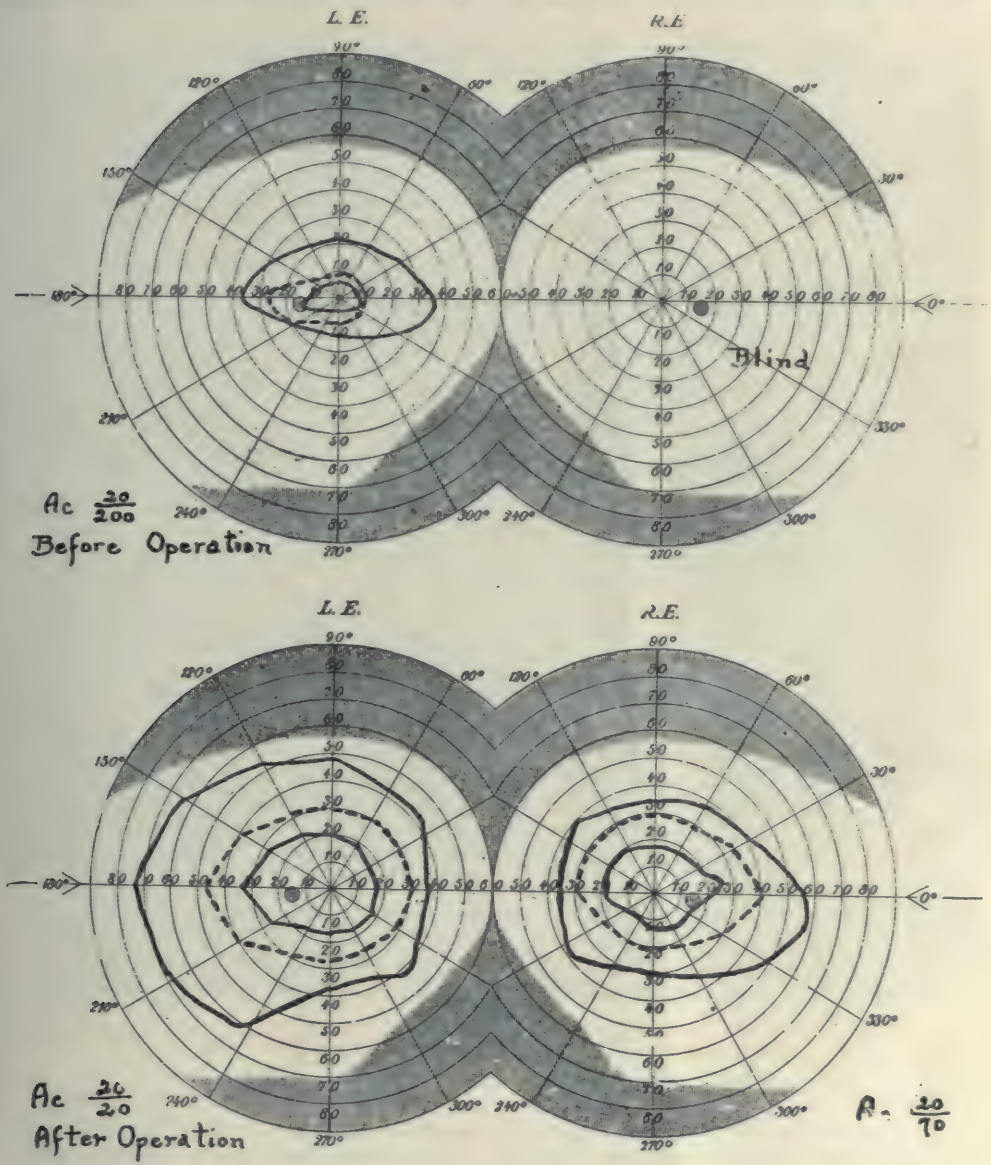

Fig. 8.—Visual fields of patient shown in Fig. 7 before and after operation. The preoperative visual field was taken two months before operation. At the time of the operation this remaining vision was lost and patient was then blind in both eyes.

spected without traction on the optic nerves. This inspection is not easy unless the optic nerves have been stretched and unless the cisterna chiasmatis is greatly enlarged. Doubtless, the slightly enlarged sella turcica was the result of the long continued endothelioma which we see so frequently arising from the dura and pushing the brain before it. The difference was only in size. Whereas the optic nerve tumors were tiny structures, the dural endotheliomata of the brain are frequently as large as

one's fist. Histologically, the tumors from both the right and left nerve were identical and were exactly like the dural endotheliomata of the brain, with the additional features of a psammoma. (Fig. 11.) The body of the tumors was made up of fibrous tissue, arranged in whorls, strands and columns. (Fig. 10.) The fibrous tissue could

Fig. 9.—X-ray to show normal sized sella in Case 2.

easily be mistaken for that of a spindle celled sarcoma. In the connective tissue were nests of the characteristic whorl like onion bodies—deeply red staining hyalin, lamellated crescents. (Fig. 11.)

The tumor surrounding the right optic nerve was totally removed. It was necessary to strip the dura from the optic nerve, it being an integral part of the tumor. The tumor had, also, grown forward into the orbit for a distance of 1 1/2 cm. The removal of this part of the growth necessitated the resection of part of the superior wall of the orbit. (Fig. 5.) The left nerve being so far distant from the operative field (a right sided craniotomy having been performed), only a partial removal of its tumor was possible. This removal, nevertheless, restored the vision of the left eye to 20/200 within two weeks after the operation, color fields returning also and being practically normal. Vision in the right eye, however, has not yet improved. The vision in this eye is known to have been totally absent for over 3 years, and this probably was of much longer duration. Whether vision so long lost can return, I am not prepared to say.

Case 2. The second patient was a normal appearing boy of 8 years (Fig. 7), referred by Dr. E. Terry Smith of Hartford, Conn. One year before admission to the hospital, his teacher noticed that his vision was not good. An immediate examination by an oculist disclosed almost complete blindness of the right eye and a marked diminution in the vision of the left. According to his father, there have been vascillations in the vision, but on the whole it has decreased, tho very slowly. When a

year old, a fork's prong is said to have pierced the right eyeball. The history about this point is rather vague, and it was not certain whether the eye had been blind since that time. His father thinks, however, his eyes had been examined subsequent to that accident and nothing found abnormal. On admission to the Johns Hopkins Hospital, there was only slight vision in the right eye and a little more in the left. No definite evidence of hemianopsia. Color is not perceived in the right and only slightly in the left eye. Visual acuity is 20/200 in left eye; fingers are seen at a distance of two inches with the right eye (Fig. 8). Dr. Smith first saw this patient 4 months ago and at that time the vision in the left eye was 20/100, and practically nil in the right. Aside from a slight pallor of both optic discs, the neurologic examinations were entirely negative. The paranasal sinuses had been repeatedly examined with entirely negative results. The skiagram of the head showed nothing abnormal (Fig. 9). The cerebrospinal fluid was normal and the Wassermann reaction was negative both from the blood and cerebrospinal fluid. He had never had headache or vomiting. There were no extraocular palsies, and he has never had diplopia. In other words, aside from a very slowly developing blindness, there was no subjective or objective

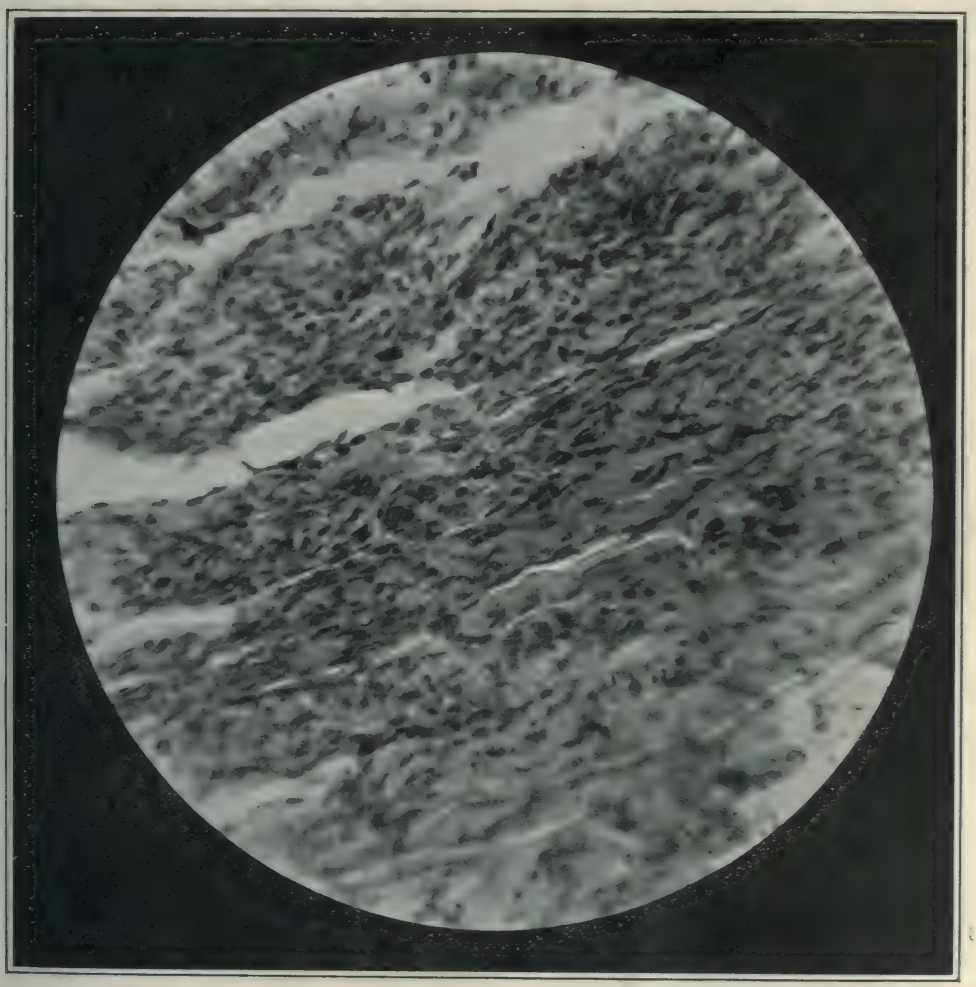

Fig. 10.—Photomicrograph of same tumor showing its fibrous character. In this section there are no psammoma bodies.

evidence of an intracranial affection. In view of the negative findings and solely by exclusion, I was inclined to assume the diagnosis of optic neuritis of some indeterminable toxic origin. The striking resemblance to the preceding case, however, forced the possible diagnosis of a prechiasmal tumor and, bearing this in mind, the patient was advised to return home for further observation of his vision. During the succeeding two months, three examinations were made by Dr. Smith and in each there was a decided reduction in vision over the preceding test. In the right eye, he had become totally blind; and with the left he could only distinguish a bright light; he could no longer count fingers. He then returned for an exploration of the chiasmal region by an intracranial operation.

A right craniotomy extending well forward over the frontal region was performed. The right optic nerve was normal as far as one could judge. There was a small circumscribed tumor about the size of a cherry beneath the *left* optic nerve, and by pushing it upward causing the nerve to arch sharply. (Fig. 12.) A thin band of fibrous tissue over the optic foramen and the anterior clinoid process held the optic nerve tightly against the tumor and produced a distinct constriction of the nerve. (Fig. 13B.) A marked pallor of this nerve gave a striking contrast to the normally pink

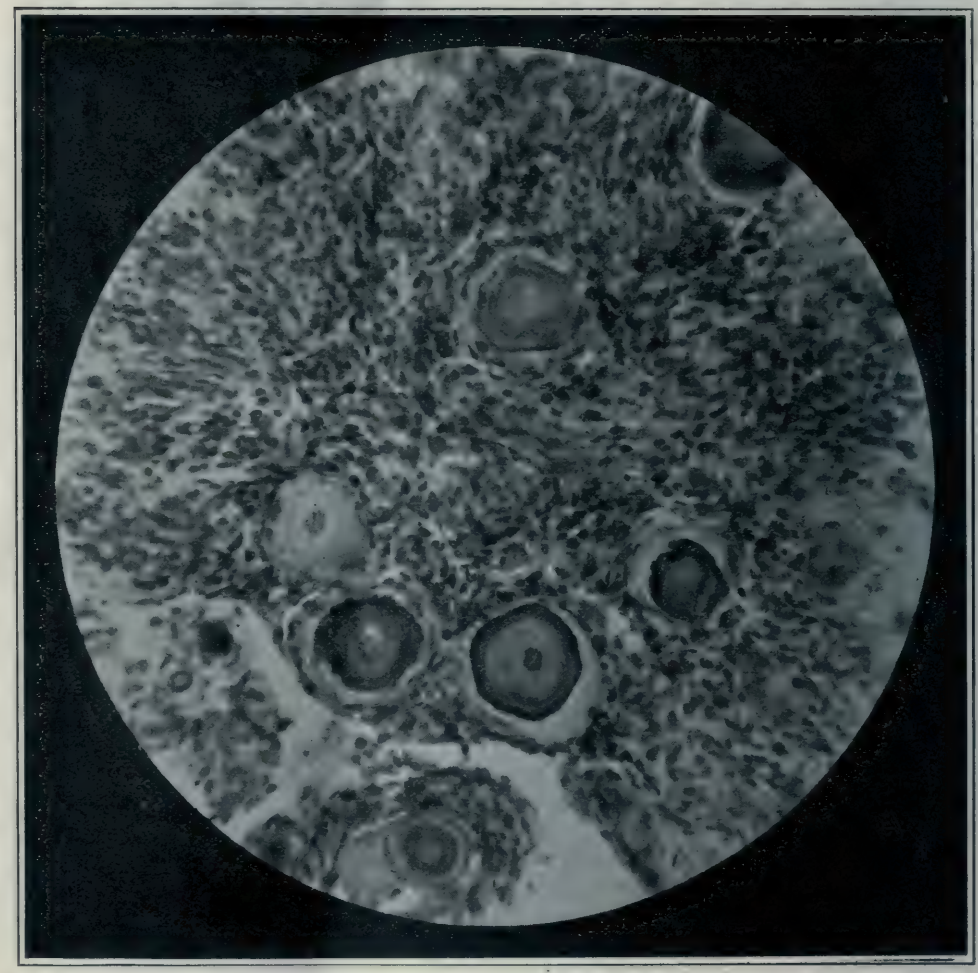

Fig. 11.—Photomicrograph of tumor showing psammoma bodies.

color of the right side. This band being incised, the nerve was at once released from the clutches of the tumor. The operative exposure had been made from the right side of the head because of the prior and greater visual loss on the right; the tumor was, therefore, too far distant to permit of its removal with safety. Fearing bleeding, because of its apparent vascularity and inaccessible position, I did not even dare remove a piece for diagnosis. The exact nature of the tumor could, therefore, not be determined, and as the major part of the tumor was hidden from view by the optic nerve, its point of origin could not be accurately determined. I feel, however, that it probably arose from the dural sheath at the optic foramen. The tumor did not seem to enter the optic foramen; it was not a small extension of a larger growth; the exposure at operation was adequate to determine this point with certainty; it seemed most likely an endothelioma. The incision of the band produced all the relief which could be obtained with safety; subsequently the tumor can be easily removed by an operation directed from the left side of the head.

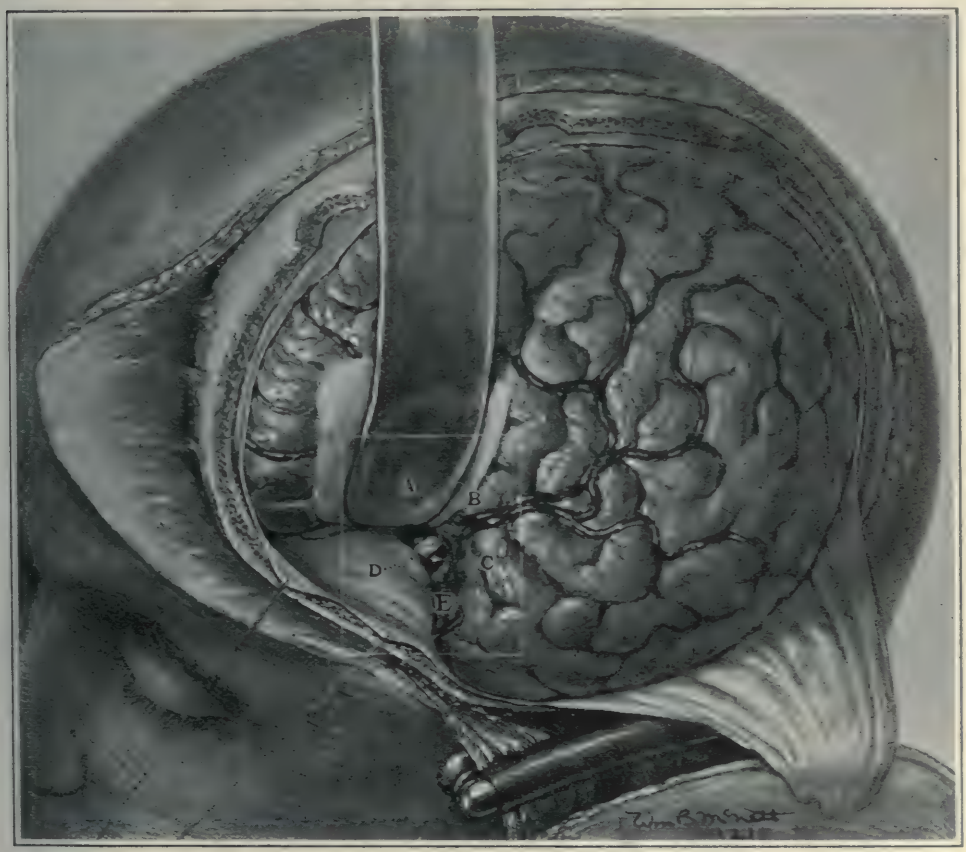

Fig. 12.—To show the operative exposure of the tumor in patient shown in Fig. 7. A Spatula retracing the frontal lobe. B. Left optic nerve between the optic foramen and optic chiasm. C. Tumor pressing upward and held by the scar (D), which is over the lesser wing of the sphenoid. B. Left carotid artery.

An amazing restoration of vision (see charts) followed the simple division of the binding band over the left nerve (Fig. 8). The visual loss was, therefore, due to a physiologic block of the nerve; apparently there was little if any destruction. I have yet been unable to understand the loss of vision in the right eye since it was not directly affected by the tumor; equally puzzling is the rapid restoration of vision in this eye. It can, of course, be explained only on a sympathetic basis. The visual acuity within two weeks

after the operation had returned to 20/20 in the left and 20/70 in the right. Almost a normal field of vision including color returned in each eye (Fig. 8). A letter received from his father as this paper is being written (six months after the operation) says his vision continues to improve and he is now attending school.

PATHOLOGIC ASPECTS OF PRECHIASMAL TUMORS.

The tumors which are here reported are representative of a well known tho

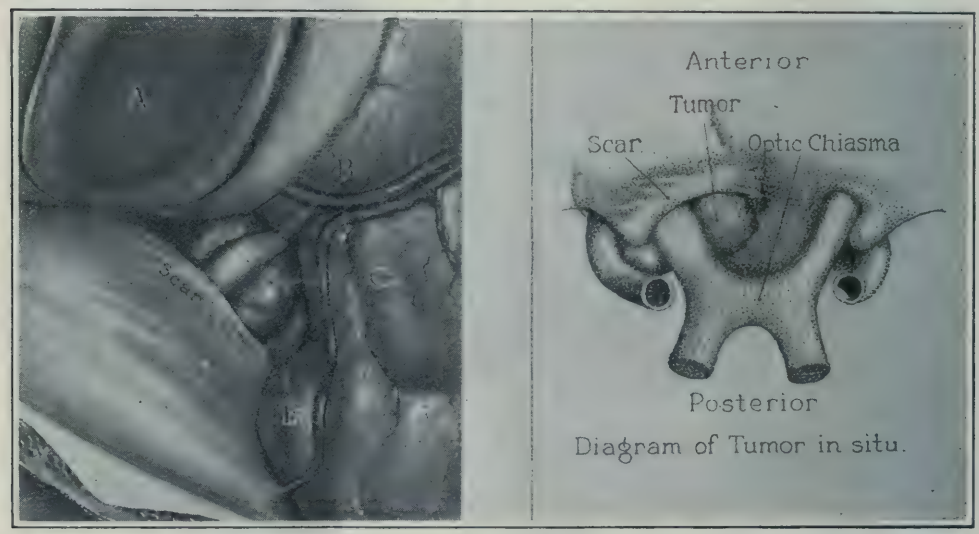

Fig. 13.—A Magnification of Fig. 12. Diagram to show relation of this tumor when looking from above.

not extensive group of endotheliomata or psammomata. They arise from the dural sheath of the optic nerve and heretofore have been described only for the intraorbital part of the nerve. This particular tumor is unusual in that it is bilateral, is perfectly symmetric and so small after at least six and probably many more years' growth. These cases are, so far as I can determine, the only reported instances of intracranial optic nerve tumors which have been diagnosed clinically and found at operation.* There is no reason to believe that intracranial optic nerve tumors should be different from those of the intraorbital part, except that within the skull the optic nerve is devoid of the dural sheath. All *intracranial* tumors of the optic nerve arising from the dura must therefore arise at the optic foramen, where the dura is reflected, and secondarily project into the cranial cavity. The three tumors here described arose at just that point.

Intraorbital optic nerve tumors have been thoroly collected and reported from time to time. Willemer[2] (1879) collected from the literature probably the first series of 27 cases; Jocqs[3] (1887) found 62 cases; Braunschweig[4] (1893) 94 cases; Finlay[5] (1895) 117; Byers[6] (1901) 118 and Hudson[7] (1912) 154 cases which together with an appended list of 28 cases brought the total to 182. There is little to be added to the excellent contributions of Byers and of Hudson. In each the literature is well covered and all the available histologic data, usually obscured in the chaos of a changing pathology, has been carefully scrutinized in order to bring them into a harmonious grouping. While these tumors may assume various histologic appearances, they may all be run down to the usual con-

*Since this paper was sent to the press, I have found a very similar case recorded from a necropsy by Schott (Archiv. f. Opth., 1877, vi, 276). A small circumscribed tumor (5x5 m. m.) was found on each optic nerve in the region of the optic foramen. Each tumor was a psammoma, containing many onion like formations. Their presence was not suspected during life. The patient was fifty-five years old and blind.

nective tissue derivatives with protean expression. Hudson has added an abstract of each of his 182 cases. Byers has considered principally the intradural tumors of which there are 102, and has appended 16 cases of extradural tumor. Parsons[8] (1902) collected 18 cases of dural (extradural) tumor. Hudson has assembled the cases into three groups: (1) those arising from the connective tissue of the nerve high percentage of intraorbital tumors which have also an intracranial extension of the growth. Apparently this applies about equally to the intradural and dural tumors. In most of the cases there is direct continuity between the intraorbital and intracranial parts of the tumor. The narrow optic foramen, which is usually but not necessarily enlarged from the effects of the tumor, gives the growth an irregular

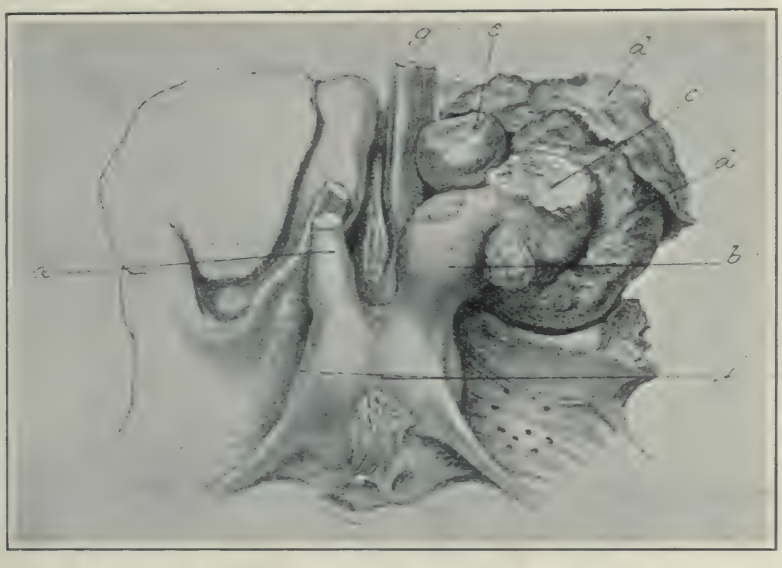

Fig. 14.—(*a*) Right optic nerve not thickened. (*b*) Enormous thickening of left optic nerve. (*c*) Surface of incision of same in the region of the enlarged optic foramen. (*d*) Large tumor growing out of left optic nerve. (*e*) Cystic protuberance of the same. (*f*) Greatly enlarged chiasm. (*g*) Displaced olfactory nerve of the left side.

Photograph from Willemer. This is one of the earliest recorded cases to show the extension of the orbital tumor into the cranial cavity and the subsequent involvement not only of the opposite nerve but of the optic chiasm as well. It may be taken as representative of the great group of intraorbital optic nerve tumors which are not localized to the orbit, but have their intracranial involvement by extension through the optic foramen. The character and extent of the intracranial involvement varies, of course, according to the type of the tumor.

—intradural—(he uses the term gliomatosis) (118 cases); (2) those due to fibromatosis of the nerve sheath (6 cases); and (3) endothelial tumors arising from the dura and analogous to endothelial tumors of the membranes of the brain; many of these tumors contain the psammoma bodies. The still simpler classification of Byers—intradural and dural tumors—subordinates all the histologic features of these growths.

From the standpoint of practical treatment, much can be learned from the clinical tables of the cases collected by Byers and Hudson, and I have drawn upon them freely. Probably the most important feature of all is the dumbbell appearance. In some cases, the intraorbital part of the tumor may be larger than the intracranial and the reverse may be true. In a few instances, there have been multiple discrete tumors involving each nerve or both nerves, and occasionally even the optic chiasm is included. In a few instances the tumor has grown backward along the base of the brain as far as the pons and medulla. At other times, it has grown upward into the brain and may even have pierced the 3rd or one of the lateral ventricles. The intracranial involvement in intraorbital optic nerve tumors was emphasized by both Byers and Hudson, but at the time of their publications there seemed

little that could be done to cure a patient when the tumor had passed thru the optic foramen into the interior of the skull.

The exact proportion of intraorbital tumors which grew into the cranial chamber can, of course, not be estimated with any degree of accuracy from the cases collected from the literature. The clinical diagnosis of brain tumors has been too unsatisfactory to give any accurate data, for tumors of the brain may grow to a tremendous size before they will be suspected. Many of these tumors have developed very slowly. A case reported by Byers, died of the intracranial growth 10 years after the orbital tumor had been removed (Fig. 15), and one by Pagenstecher and Steffan[9] died 25 years after the removal of the tumor of the orbit. Frequently, the intracranial extension of the tumor has been known by the fact that tumor tissue has been cut thru when the orbital tumor has been removed, making of course an incomplete removal of the neoplasm; but this operative report has often been lacking, and often pathognomonic symptoms of the late phases of the intracranial growth or the post-mortem proof has given the inadequate information at hand. From 102 cases of intradural tumor in Byers' series, at least 23 gave indisputable evidence of an intracranial involvement; and from Hudson's series of 182 cases, 17 additional cases have been found, i. e., cases which have not been included in Byers' series. From 191 cases of both series (cases not duplicated) there are, therefore, 40 cases (21%) in which the intracranial involvement is certain. The actual percentage is, of course, very much higher, for the ultimate results of most cases cannot be obtained, either because the patients cannot be traced or because necropsies have not been obtained. On the other hand, Byers states that from his 112 cases

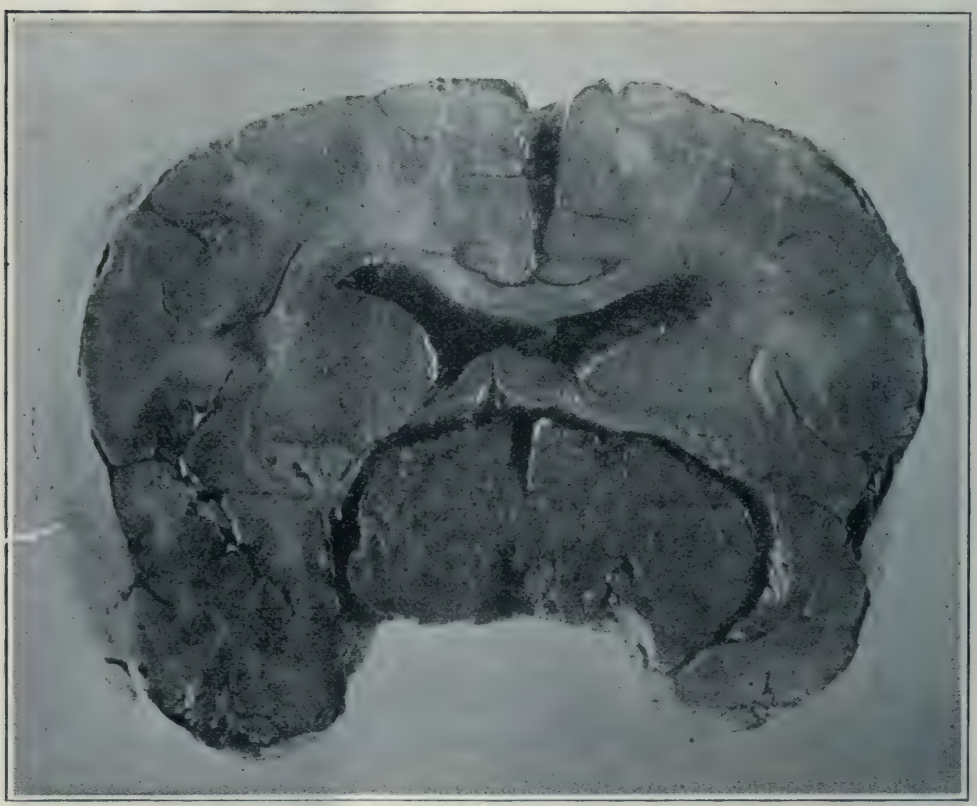

Fig. 15.—Photograph from the article of Byers, showing a large intracranial growth as part of an intraorbital tumor. This post-mortem was made ten years after the first operation in which the orbital tumor was removed.

"only 8 are known positively by record to have continued in a good state of health beyond five years."

An analysis of Hudson's tables, from the viewpoint of the operative findings, strikingly shows the great proportion of cases in which orbital tumors are complicated by an intracranial extension of the growth. The reports from the operators who have removed the orbital tumor show, that in at least 51 out of 118 intradural tumors the tumor removal was probably incomplete (43%); and from 34 dural tumors, 13 (or 39%) were probably incompletely removed. 64 of the total number of 152 cases were therefore only partially removed (42%). As many cases which were not completely removed would never be so reported, the actual percentage of orbital tumors having intracranial extension would be much higher.

Even more astounding and impressive is the analysis of all the reported necropsies in the entire series of cases reported by Byers and by Hudson. Of 23 postmortem examinations which were obtained in cases of intraorbital optic nerve tumors, 21 showed an intracranial growth and in only one instance did the cranial cavity contain no tumor. Fourteen (14) of these autopsies were obtained on patients who died of meningitis within a few days after the orbital tumor had been removed; the intracranial tumor, therefore, was present when the orbital growth was treated; three (3) necropsies were obtained when the patient subsequently died of intracranial pressure; and in five (5) necropsies the tumors were found in patients who died of an intercurrent disease; in two of these, the tumor of the optic nerves was an unexpected finding, tho the patients had been blind.

Apparently both dural and intradural tumors of the optic nerve give intracranial involvement in about equal proportion. From 118 cases of intradural tumors in Hudson's list, 20 were definitely known to have had intracranial tumors (17%), and 7 of 34 dural tumors had tumors in the cranial cavity (20%). The actual percentage in each variety is, of course, very much higher.

The most striking clinical difference between the intradural and dural tumors within the orbit, and doubtless the same is true of those within the cranium, is the average age of onset and the rate of the tumor's growth. Again we refer to the excellent tables of Byers and Hudson, both of which are so complete in every detail. Among the intradural tumors, 62% develop the symptoms of onset in the first decade of life and 90% before the twentieth year. The dural tumors, however, are distributed fairly evenly according to decades, slightly more than half being accounted for after the 30th year of life. The dural tumors on the whole grow very much more slowly than the intradural tumors, tho exceptions to this rule occur in both varieties of tumor.

THE DIAGNOSIS OF PRECHIASMAL TUMORS.

While *intraorbital* tumors of the optic nerve are early betrayed by exophthalmos, the interposed optic foramen precludes this pathognomonic clinical information in *prechiasmal* optic nerve tumors, at least until the orbit has been secondarily invaded. The pure prechiasmal tumors, such as those entered in this paper, that is tumors affecting only the intracranial part of the optic nerve, will probably give only a progressive loss of vision in one or both eyes. In the early stages of the tumor's growth, the mass is too small to produce any signs of intracranial pressure, and when these do appear, it can be fairly certain that the tumor has become very large and will almost certainly have completely blinded the patient. In each of these cases, there has been a *primary* optic atrophy, with a pale bluish white glistening disc and no changes in the size or shape of the veins or arteries in the fundus. In many of the orbital tumors, swelling of the disc (optic neuritis) has been reported. The cause of this swelling is not exactly clear, but it has been reported so frequently that it must be regarded as authentic. Whether a similar ophthalmologic picture could be obtained in prechiasmal tumors, must be left open. However, in a large

series of intracranial tumors producing a primary optic atrophy from direct pressure on the visual tracts, I have never seen a choked disc until the tumor had grown large enough to have produced marked intracranial pressure. In fact, the ophthalmologic examination is often sufficient evidence to make the diagnosis of a brain tumor compressing the optic nerves directly. One must, of course, think of the probability of intraorbital pressure producing a choked disc just as does intracranial pressure. Both the orbit and cranium are closed chambers with inadequate vent for any unusual or rapidly increased pressure.

The skiagram of the head should show no abnormality in the earlier stages of growth of these tumors; there should be no discernible change in the anterior or posterior clinoid processes. There may be changes in the visual fields such as an atypical nasal or temporal hemianopsia on the affected side; this would not be unexpected, but there is no definite evidence of it in the scant examinations afforded by these cases. The differential diagnosis between some form of optic neuritis and a prechiasmal tumor lies principally in the character and rapidity of the visual loss and the character of the eye grounds. A typical optic neuritis gives a more rapid, even at times fulminating, history of visual loss, and is usually accompanied by marked changes in the eyegrounds (neuroretinitis). There are the added but variable manifestations of optic neuritis—central scotoma and enlarged blind spot. Prechiasmal tumors will produce a very gradually progressive loss of vision, the time depending, of course, on the character of the tumor and (this may not be absolute) the fundus should show the characteristics of a primary optic atrophy. There has been nothing in the history of these two cases to suggest a central scotoma. There are, of course, instances of so-called toxic neuritis, in which a known or possibly even an unknown toxin will produce blindness, and the disc will not be unlike that of the primary optic atrophy due to pressure of a tumor on the nerve. There is frequently a central scotoma or enlargement of the blind spot in these forms and also the affection is apt to be bilateral. Unless one has a very definite history of a specific toxin, the diagnosis of toxic neuritis must be one of last resort, and one solely of exclusion of all other possible factors. Intracranial tumors other than those which are of primary origin in the optic nerve, can give a similar clinical picture, and when small and implicating the optic nerve directly, there is no way of making a differential diagnosis. The indicated therapeutic measures, however, would be identical, so that this refinement of diagnosis is not essential. By far the most frequent tumor in this region is the pituitary tumor, which typically, but by no means always, produces a hemianopsia of the bitemporal type; it moreover nearly always shows in the skiagram the characteristic destruction of the sella turcica. There are extremely few pituitary tumors which have been diagnosed without one or the other and usually both of these two objective findings: (1) destruction of the landmarks of the sella turcica, (2) hemianopsia, usually bitemporal, occasionally homonymous.

The most difficult diagnosis to make or to exclude is a second intracranial lesion when an orbital tumor has been removed and apparently does not pass thru the optic foramen. The signs which such a tumor should give have already been given by the intraorbital tumor and, therefore, cannot be considered. The diagnosis of the intracranial extension of these tumors must then await one of three objective signs: (1) extension of the visual defect either to the chiasm or the opposite optic nerve, (2) roentgenologic evidence of destruction of the landmarks in the region (principally the sella turcica), (3) the advent of signs of intracranial pressure.

OPERATIVE TREATMENT OF OPTIC NERVE TUMORS.

In considering the treatment of prechiasmal tumors, I of course include all tumors of the optic nerve in the prechiasmal region, whether primary in the orbit or cranium; and because of the intimate relationship between the orbital and intracranial tumors, it

is necessary to consider all optic nerve tumors in a general way. Until now, the treatment of orbital tumors has been restricted to the removal of the intraorbital tumor. The future of the patient has then been left to chance. And we have seen from the ultimate results, inadequate as they are, that a very high percentage of these patients die of an intracranial tumor. One cannot do better than quote the well stated conclusion of Byers in regard to this aspect of intraorbital optic nerve tumors: "The danger is not from recurrence in the strict sense of the term, but from the continued development of the intracranial portion of the tumor which it is impossible to remove at the time of the operation." This statement was made 20 years ago. Only now has surgery developed to meet this condition.

There are, therefore, two problems to meet in the treatment of all optic nerve tumors, whether intraorbital or intracranial. First and most important, to save the life of the individual and second to save the vision which remains and, if possible, restore that which is gone. I shall merely mention here and shortly publish elsewhere an operative procedure by which both of these objects can be attained. It is not to be inferred that all cases of optic nerve tumor can be cured. Much depends upon the stage at which the diagnosis is made and also upon the character of the tumor. If the intracranial tumor is diagnosed in the late stages there is little point in any operative procedure; the tumor would be too large and would have grown too far back along the base of the brain. Again, in very young children with a rapidly growing tumor, doubtless sarcoma, probably nothing could be done. But in the vast majority of cases, the entire intracranial tumor could be removed and with little danger to life. Fortunately, the optic nerve is more or less suspended in the cranial chamber so that its resection, if necessary, would not be difficult and if a tumor is appended to the nerve its dissection from the nerve would be comparatively simple. The operative procedure consists in turning down a large bone flap, well forward, so that the exposure of the optic tracts is not impeded by lack of room. The procedure was originally intended solely for the intracranial part of the tumor, but in one case the growth extended into the orbital cavity and the roof of the orbit was easily removed, and the intraorbital portion of the tumor enucleated at the same time. The roof of the orbit can then be replaced as in Krönlein's operation. The intracranial operation is advocated for all tumors in which an intracranial optic nerve growth is known to be present. I am not yet prepared to say how far this procedure should be adopted in intraorbital tumors of the optic nerve. It must depend upon a more careful report of the pathology of optic nerve tumors, i. e., exactly what proportion of these tumors have intracranial extension of the growth. If it is found from autopsies and reliable clinical data that most orbital tumors enter the cranium, then this intracranial operation (which combines the intraorbital also) will be found the safest procedure in the beginning, rather than to await the verdict of the operator who has done a local removal of the orbital tumor. In safe hands, the operation itself is practically without danger; it is the removal of large growths which adds the danger.

The reports in the papers of Byers, Hudson and all other authors, of the terrific mortality from meningitis following the removal of intraorbital tumors, reflects the bad treatment of these tumors in the past. There is now, of course, little excuse for any procedure which will permit meningitis. No operation should be performed thru a field which cannot be sterilized and protected. For this reason, operations thru the palpebral fissure and conjunctiva cannot be too strongly condemned. A cerebrospinal fistula results when the optic nerve is severed and it is then almost impossible to prevent meningitis. Krönlein's operation seems the best and safest of the local procedures; it gives the best exposure, and the operator can work thru an aseptic field.

When a local operation has been performed for the orbital tumor and it is found that its complete removal is im-

possible, the intracranial operation must then be done, for unless the tumor can be completely removed, total blindness and death are inevitable. Whatever operative procedure for an intraorbital tumor we may consider best and safest at the onset, this must be adequate to assure the patient that an intracranial extension of the growth does not exist, for when following the interval after the operation the intracranial growth later becomes evident from symptoms of intracranial pressure, the chances of life are gone; the tumor is then too large. As is true in all other intracranial tumors, an early diagnosis simplifies the operative procedure, reduces its dangers and affords the patient the best chance of life and preservation of function.

SUMMARY AND CONCLUSIONS.

1. Two cases of tumors of the intracranial part of the optic nerve are reported.

2. In one case there were two bilateral, symmetric tumors at the optic foramen. Each of these tumors was a psammoma, i. e., a dural tumor, usually considered a dural endothelioma. In the second case, there was a single tumor on the left optic nerve at the optic foramen. In both cases there was bilateral loss of vision.

3. The symmetric tumors entered the orbit thru the optic foramen, the other tumor was strictly intracranial.

4. One was diagnosed clinically; the other was suspected after an earlier diagnosis of optic neuritis; both were found at operation.

5. From the case with the bilateral tumors, all of one tumor and part of the other was removed. The vision was greatly improved as a result.

6. In the second case, the tumor could not be removed because it was under the optic nerve on the side opposite the operative approach. A band of adhesions bound the tumor to the anterior clinoid process, and its incision liberated the nerve from the clutches of the tumor and complete restoration of vision resulted.

7. A very high proportion of intraorbital optic nerve tumors extend into the cranial chamber. Local operations on the orbital part of the tumors in these cases are, therefore, not only futile but give the patient a false sense of security until it is too late.

8. The only justifiable local treatment of intraorbital tumors is one which at once assures the patient that an intracranial extension either does or does not exist.

9. If either a primary intracranial tumor of the optic nerve or a secondary intracranial extension of an intraorbital tumor is present, only an intracranial operation which aims at the removal of the tumor, offers the patient any chance of the preservation of life or vision.

10. An operation is proposed, the object of which is to remove the intracranial or the combined intracranial and intraorbital tumors when both are present.

11. The differential diagnosis of prechiasmal intracranial tumors from other lesions is considered.

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TARGET PRACTICE WITH HERING'S DOUBLE EYE.

MARC LANDOLT, M.D.

PARIS, FRANCE.

A champion shot with the revolver was found to have slight anisometropia and to use both eyes in sighting, one focussing on the sight and the other on the target. Correction of the difference impaired his aim and reversal of it still more so. The writer experimented himself and with other champion shots and finds, that while binocular aim is impossible for the isometropic, it may be practiced by those who have the right anisometropia. This is easier with the revolver than with the rifle. (Translated by Dr. Oscar Raeder of the American Hospital, Paris.)

Some time ago I had the opportunity of making an interesting observation on the subject of Binocular Vision; it was presented by me to the Ophthalmic Society of Paris (February, 1920), and provoked the idea of several experiments, the details of which I shall now describe.

The patient was a captain of the French army, 48 years of age, champion shot with the revolver, who consulted me because he had experienced difficulty in aiming for some time past.

On examination: O.D. 170° —1 ⌒ —0.50. V. = 1.25. O.S. 170° —1 ⌒ +0.25. V. = 1.25.

Before making any correction, I asked him: "With which eye do you aim?" "With both," he answered. "You keep both eyes open in aiming, a common practice, but with which eye do you sight?" "With both; I watch the bead with the right eye, and the target with the left."

Not convinced of his statement I corrected both eyes for distance. The patient, taking a revolver out of his pocket, drew a bead, and at once declared he could not aim with these lenses. Following his tack, I corrected the left eye for distance, and the right I adjusted with a lens to focus on the bead. The captain then made another trial and stated he could now sight perfectly.

It must be admitted that the anisometropia of this individual had permitted the existence of some independence between the two retinae, if I may so say, but had not interfered with cerebral binocular vision. This man truly had a double eye, according to theory, but consisting of two elements not identical.

Until the age of 48 years, the accommodation had remained sufficiently flexible; when the left eye, slightly hypermetropic, made the necessary effort to accommodate for distance, the right eye became still more myopic, so as to focus on the gun.

In correcting the sight it was necessary to maintain the same conditions; the lenses prescribed were: O.S. 170°—1⌒ +0.25. O.D. 170°—1⌒ +0.50.

That amounted in fact to correction of the former for distance, and to give to the latter a myopia of 1 D. The correction proved to be right, for the captain since wrote me as follows: "I cannot tell you how well pleased I was with the results obtained with the glasses prescribed by you. The least I can say is that I have won the world's championship for pistol shooting at 50 meters, wearing the glasses made according to your prescription . . . etc."

This officer, in view of his championship, was put in command of the "Centre d'instruction des Autos-Mitrailleuses." All the young soldiers are taught, he tells me, to aim with both eyes open as he does, and succeed well, it appears, after a short time. As we must suppose that the majority of these men are normally constituted—i.e. isometropic—I have wondered if it was positive that they have all learned to aim in the same fashion as their chief who is abnormal.

I have made several trials at aiming and firing, and I came to the conclusion that it is really possible to keep both eyes open, but that, under ordinary circumstances, only one eye is used in aiming. Similarly many oculists keep both eyes open during ophthalmoscopy, but disregard the image

from one eye. Moreover this fact has been confirmed to me by many experienced marksmen.

Going further I wished to put myself in the position in which this officer had been put by nature. I therefore, by means of a trial frame, adjusted my left eye for the target and the right to the distance of the bead.

My first attempts were made with a small air rifle possessing no accuracy, and with my army revolver. With these two arms I was able to prove that it is much easier to aim with the revolver because, the barrel being shorter, the distance between the notch and the bead was shorter and necessitated no considerable oscillations of accommodation of the aiming eye. Then also the notch is at a greater distance from the eye than in the case of a gun; and finally the revolver is held straight in front, which prevents all prism effects which are possible when the head is held obliquely in shouldering the rifle.

Here are the measurements found for the revolver: Distance from eye to notch (hind sight), 63 cm., accommodation = 1.6 diopters. Distance from eye to bead (front sight), 77 cm., accommodation = 1.3 diopters.

The difference in accommodation of 1/3 of a diopter should be negligible in practice, for, with a little training, convergence and accommodation can be made to dissociate more than that.

For my small air rifle the distances are as follows:

From eye to notch: 27 cm. (A = 3.7.) From head to bead: 60 cm. (A =1.66.) (See Fig. 1.)

The variation of accommodation is much greater, and the effect on convergence of course also.

The test of the accuracy of the aim, is, of course, the shot. The results of my first experiments were mediocre; but, as I have said, I had to work with two arms, one of which was not accurate and the other equipped with a very rigid trigger; moreover I was using in the revolver not fully charged car-

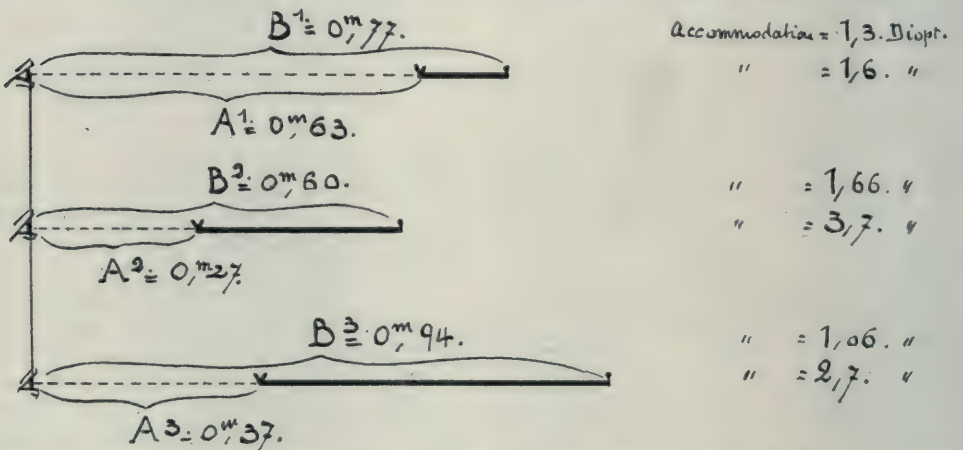

Fig. 1.—Diagram indicating distance of sights from eye. Top revolver, middle air rifle, and bottom, rifle of highest accuracy.

tridges, another reason to render the firing altogether unreliable.

However I was able to establish one point, and that is this: I had undertaken two series of aiming experiments; in the first I left the weapon unchanged, for the second I fitted the weapon with a card perforated by an opening corresponding to the diameter of the barrel, and placed in front of the bead, or front sight, so as to obscure the target entirely from the right eye.

Now the result was much more accurate in the former case. I believe that in spite of the correction of the right eye, I was able to make the blurred image which was formed by the target on this retina coincide with the distinct image of the left eye; in any case there was a certain superpo

sition which prevented too great a deviation.

Thanks to the kindness of my friend Mr. Paul Colas, I was able later to

Fig. 2.—Target showing revolver shots sighting with one eye.

carry on my experiments under the very best conditions.

At first I thought it desirable to fix a gun in a rack and to control the binocular aim by a monocular aim; but I was advised against this. So we proceeded to real shooting.

We began with some revolver experiments. A good marksman was kind enough to take a first aim, free hand, sighting with but one eye. The weapon was unknown to him, and the trigger, as I have said, much too stiff. The result was, nevertheless, not bad; the five shots being close together. (Fig. 2.) The barrel was then furnished with a shield, so as to obscure the target from the right eye. Both eyes were kept open, but without any optical correction. Immediately the aim became bad; the shots passed well off to the left, to various degrees, one of them missing the target altogether, in spite of the enlargening of the target. (Fig. 3.)

The most conclusive experiments were made under conditions permitting of an aim as steady as possible. The arm was a rifle of highest accuracy, the gunner was seated, his elbows resting on a table, and the barrel resting on a conveniently high pile of folded blankets.

We confined ourselves to the most difficult method of aiming, i.e., with a shield mounted on the barrel, obscuring the target from the right eye.

The measurements of the rifle were as follows:

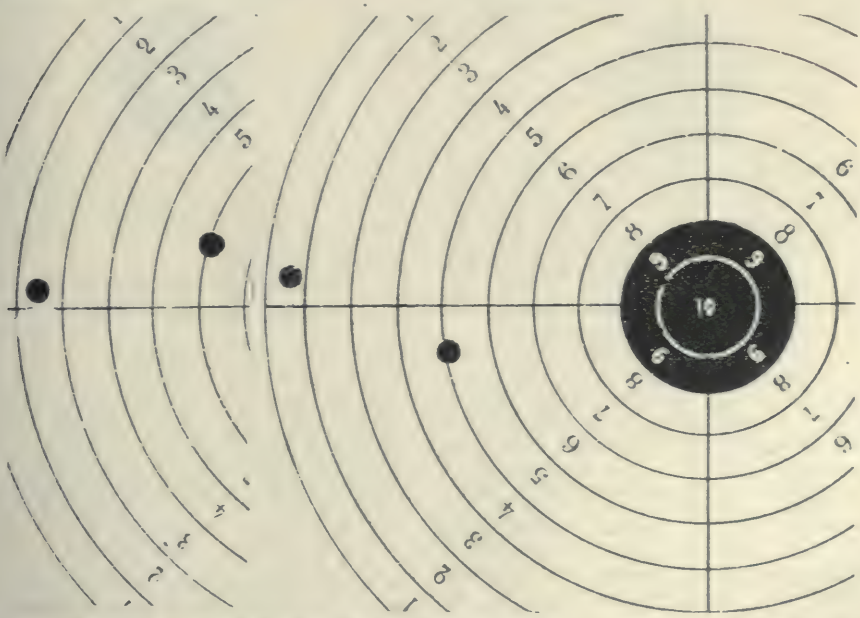

Fig. 3.—Target showing rifle shots with shield hiding it from the right eye, both eyes open. Shots passed to the left, one missing target entirely.

From eye to notch: 37 cm. (A. = 2.7 D.) From eye to bead: 94 cm. (A. = 1.06 D.) (See Fig. 1.)

The marksmen were:

Mr. Paul Colas.* A first class shot, in excellent form. Age 41. O.S. 90° —0.25 + 0.25 V. = 1.75. O.D. 100° —075 + 0.25 V. = 1.75.

Mr. Johnson. Excellent marksman and in good form. Aged 44. O.S., O.D. Emm. V. = 1.25.

Dr. Ed. Huebscher. Formerly classed as a good shot, but who had not practised for over 7 years. Age 25. O.S. Myopia 1.75. V. = 1; O.D. Myopia 2. V. = 1.

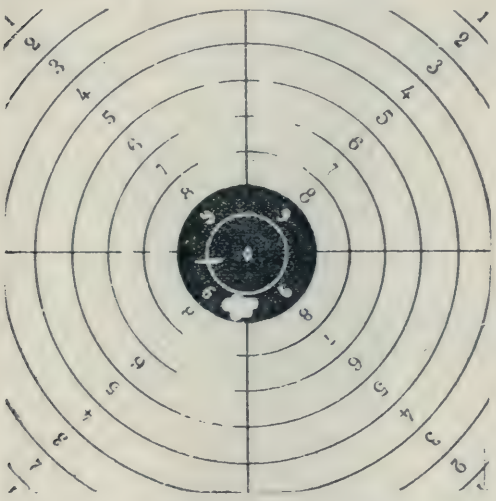

Fig. 4.—Target of Mr. C. shooting rifle under usual conditions.

Dr. Marc Landolt. Out of shooting practice for 18 years. Age 42. O.S. O.D. Hypermetropia 1.25. V. = 1.50.

Mr. C. began by making a trial under the usual conditions. (Fig. 4.) The five shots were so accurate as to make just one large perforation.

Then the gun was furnished with a shield; the marksman was given no optical correction whatever. Mr. C. immediately experienced great difficulty in aiming. Not only did the images corresponding to the two fields of vision not always appear synchronously, but the target would apparently be displaced, more or less suddenly, and for various distances, in the horizontal. The point aimed at was always the center of the target. The shots swerved to the left and spread further and further. (Fig. 5.) Fitted with two different correcting lenses, one for the distance of target (left

Fig. 5.—Mr. C. with right eye shut off from target. Shots all passed swerved to the left.

eye), the other for the distance of front sight (+1. right eye), Mr. C. found himself entirely embarrassed and gave it up.

Mr. J. then submitted to the experiment. His left eye was left naked; the right corrected, after trials, with a +0.75 which permitted him to read fine printed text at the distance of the bead. The aim of Mr. J. was excellent, considering that the conditions under which he shot were altogether abnormal and new to him. (Fig. 6.)

Dr. Ed. H., on the contrary, corrected only his left eye (—1.75), and kept the right eye—no doubt a bit too my-

*Mr. Paul Colas had been champion shot at 600 meters, at the Olympic games held in Stockholm in 1912, after a very close match with the American, Lt. Osburn. (Champion at Antwerp in 1920.)

Mr. Johnson had been champion of France, and finished second at the 200 meter rifle range in the Olympic games at Antwerp in 1920.

I wish to express my cordial thanks to these gentlemen for their esteemed opinions and valuable cooperation.

opic for the purpose—without correction. His result under the novelty of conditions was also fairly good. (Fig. 7.)

In my turn I made a first trial under ordinary conditions. The result is shown in Fig. 8. The left eye was shut, the right corrected for distance. (The shot below went off without my control, on account of the very soft trigger.)

For the second trial I used the following glasses: O.S. +1.25. O.D. +2.25. As expected the results were less exact. It is to be noted, in particular, that the errors were to the left. (Fig. 9.)

The binocular aiming, under the circumstances cited above, is rendered difficult by two different factors.

When the two eyes are *isometropic*, the target undergoes a series of apparent oscillations, in the horizontal, which do not permit the two images to superimpose each other for a period of time long enough to assure a good

Fig. 6.—Mr. J., left eye naked, right wearing correction.

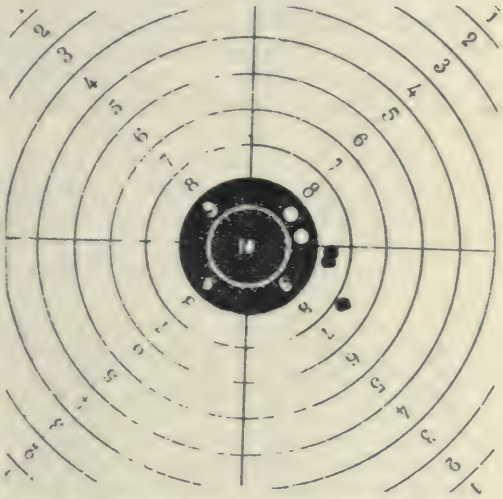

Fig. 7.—Mr. H., left eye corrected, right without correction.

Fig. 8.—Dr. L., left eye shut, right corrected for distance.

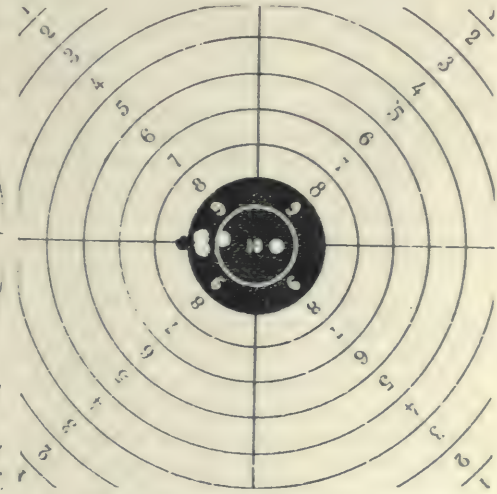

Fig. 9.—Both eyes wearing glasses. Left correction; right plus 1. D. added.

aim. Besides there is certainly a struggle between the two retinae on account of which it is impossible to perceive the two images simultaneously except for very short periods.

In the case of *anisometropic* vision, the first factor is almost entirely eliminated; the lateral deviations are scarcely perceptible. But the struggle between the sensations coming from the two retinae is very pronounced. Sometimes the target is seen alone, then an image of the front sight and back sight floats into the field and finally replaces that of the target. This alternation is not very regular as to time. In my own case, I followed the line of aim with the right eye, then, at the moment of each substitution of images, I could see the center of the target; after 3 or 4 of such substitutions I had simply to fix well on the target and draw the trigger at the precise moment when the bead reappeared.

When we compare our results, we are struck by the following fact: Mr. C., Mr. J. and myself swerved to the left, whereas Dr. H., on the contrary swerved to the right. The deviations were greatest for Mr. C.; indisputably the best shot. This is because he aimed binocularly without being anisometropic, i.e., without being corrected simultaneously for distance and for the sighting apparatus. The efforts of accommodation necessary for him to follow the line of aim, without doubt provoked corresponding movements of convergence. These caused the sensation of oscillation and the deviation to the left of the image of the left eye.

The phenomenon is the same, altho very much less marked, in the case of Mr. J. The right eye is corrected with a lens of +0.75 for the front sight, a distance of about one meter (40 inches), but the slight accommodation necessary to focus on the hind sight seems to have been sufficient to cause a leftward deviation of the image of the left eye.

In my own case, being hypermetropic and presbyopic, and besides, a marksman in poor practice, the phenomenon was more manifest. If a shot was carried to the right it is but another proof of the instability of the vision in the horizontal.

Dr. H., as we have stated is, on the contrary, myopic. The left eye had been corrected for distance, the right eye remaining myopic. His 2 D. were more than was needed for proper vision at the distance of the bead, and the marksman made absolutely no effort of accommodation—"he did the contrary" one might be tempted to say—and his shot deviated to the right.

From our experiments one can conclude:

If many marksmen keep both eyes open, they do not see with more than one, and disregard the image of the other.

Binocular aim is impossible if the eyes are isometropic because of the variations of convergence which accompany the more or less rapid changes of accommodation necessitated by the successive focussing on the target, the bead, and the hind sight. These variations in convergence produce an apparent displacement of the target which forestalls all accurate aiming.

Binocular aim is possible with anisometropia, on condition, naturally, that the difference in refraction between the two eyes corresponds as nearly as possible to the difference of the distance between the target and the aiming apparatus. If marksmen finding themselves for the first time under these abnormal conditions arrived, on first trial, at results of as passable an accuracy as shown here, a congenital "anisometrope" must doubtless be able to aim binocularly.

The *anisometropic* aim is considerably more facile when the weapon is not furnished with a fender, when consequently the image of the target is formed on both retinae, even tho the two images are not equally well focussed.

The *anisometropic* aim is perforce more easily taken in the case of the revolver than with a rifle, for, the barrel being shorter, the absolute vari-

ations of accommodation are smaller; in fact so small that they are almost negligible in practice, especially for a congenital anisometrope. These variations are still less important when they are evaluated in relation to the distance from the eye to the hind sight, which is larger for the revolver than for the rifle. The angles of convergence are therefore relatively smaller.

The officer mentioned at the beginning of this article fulfilled to a nicety the conditions required for binocular aiming. The difference between his eyes is 0.75 D. He therefore is an exception, and it is hardly possible that any of the young soldiers he instructed had really learned to aim in the same manner as their master, tho the latter was convinced that they had.

RECURRENT HEMORRHAGES INTO THE RETINA AND VITREOUS OF YOUNG PERSONS.

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This paper is based on five cases encountered by the writer, the histories of which are here included, and the cases found reported in the literature, 110 in all. It was read before the American Ophthalmological Society in June, 1921, accompanied by elaborate tables of cases apparently due to tuberculosis, syphilis, gastrointestinal trouble, focal infections, menstrual disturbances, and disturbances of blood and circulation, with undetermined causes in 51 cases. The principal conclusions drawn from this study are here given. The detailed tables are published in the Transactions of the American Ophthalmological Society.

The symptom complex of recurring hemorrhages into the retina and vitreous, followed by retinitis proliferans in young persons, has been well understood by ophthalmologists for many years. The predisposition of some young men to spontaneous hemorrhages into the eye was first described by von Graefe[1] in 1854. Modern textbooks refer to this condition, and considerable space is allotted to it in the American Encyclopedia of Ophthalmology.[2] The etiology of this condition, however, has not yet emerged from the realm of speculation.

Forty years ago, Eales[3] accurately described the symptoms and course of recurrent retinal hemorrhages. His cases occurred in males between the ages of fourteen and twenty years. The left eye was first affected. There had been a history of epistaxis and constipation in most of the cases, and the author attributed the condition to a neurosis which affected the digestive and circulatory systems. Eales believed that the disease did not occur in women, and that menstruation acted as a safeguard.

Panas called the condition "Ocular Epistaxis," and noted that in the young the hemorrhage was from the veins, whereas in the old the bleeding was from the arteries. Beaumont[4] and others have reported cases associated with epistaxis.

In 1882 Hutchinson[5] advanced the theory, that some cases of recurrent retinal hemorrhages occurring during adolescence were due to congenital gout. Leber suggested oxaluria as a cause, and Jacqueau[6] reported a case which he thought was due to a phosphaturia and excess of urea. The hemorrhages in this case recurred over a period of sixteen years. Syphilis, both congenital and acquired, has been advanced as an etiologic factor.

Noll,[7] in 1908, was the first to suggest tuberculosis as a cause of recurrent hemorrhages into the retina and vitreous.

In 1909 Kipp[8] described a case of recurrent hemorrhage into the retina and vitreous of both eyes in a young man with tuberculosis of the hip and chronic otitis media. The hemorrhages were followed by retinitis proliferans. A second case, which he had reported before this Society in 1895,[9] occurred in a young man who had a cough and lost weight shortly after the occur-

rence of the retinal hemorrhages, but who later regained perfect health. Kipp suggested that these cases were of a possible tuberculous nature. Axenfeld's[10] article in 1910 called attention to the fact that recurrent retinal and vitreous hemorrhages were often due to tuberculosis, even tho no apparent tuberculous changes had occurred elsewhere in the eye. This author reported 3 cases to support his view. He believed that the lesions were due either to the tubercle bacilli or to the actions of their toxins, and that the individuals suffering from the disease were frequently robust and apparently in good health. Improvement followed the administration of tuberculin in Axenfeld's cases, and he advised its use as a diagnostic and therapeutic measure. Since Axenfeld's observations, Igersheimer,[11] Harms,[12] Jackson,[13] and many others have reported cases due to tuberculosis. (See tables.)

Toxemia has been suggested by Moissonnier[14] as a cause; and recently Zentmayer[15] has called attention to the possibility of derangements of the endocrine organs, especially the adrenals, as a contributing factor.

Hemophilia, disorders of menstruation, indicanuria, excessively high or low blood pressure, the anemias, nephritis, exercise, and other conditions have been mentioned as possible causative factors in the production of recurrent intraocular hemorrhage in the young.

In the past six months there have come under my care three young men with recurrent massive hemorrhages into the retina and vitreous. I have been impressed by the similarity of the symptoms in these and other cases that I have seen. In attempting to determine the basic etiology of the hemorrhages, my interest in this disease was sufficiently aroused to search the literature to see what had been written on this subject.

The following reports are of cases which have come under my care since 1916:

Case 1. A farmer, aged twenty-eight years, had massive recurrent hemorrhages into the retina and vitreous of the right eye, following a periphlebitis of the retinal veins. A focal reaction to tuberculin was obtained. The hemorrhages remained confined to the right eye. Jackson reported this case with other cases of tuberculosis of the retina before this Society in 1919, and I will refer you to the Transactions for the details of this case.

Case 2. W. P. B., aged forty-two years, seen first May 16, 1919. Three years before he had developed pulmonary tuberculosis, and had come to Colorado, where he rapidly regained his health. For three years he had felt well and had not coughed. The vision of the left eye always had been poor, probably from an amblyopia ex anopsia. History otherwise negative. One year prior to consultation, the vision of both eyes had blurred suddenly; it gradually improved, but did not regain its former acuity and floaters have been present ever since. May 12, 1919, the vision became suddenly clouded. There had been no pain or discomfort in the eyes at the time of the blurring or since. When first seen, V.R.E., 0.05; L.E., 0.2. The right vitreous contained small masses of blood; these were more numerous in the lower half. The remainder of the vitreous was uniformly hazy. A hammock shaped subhyaloid hemorrhage, with its convexity downward, was noted, extending from the lower temporal vein to the lower nasal vein. The veins were uniformly distended and tortuous. A perivascular, yellowish exudate, covering one of the terminal branches of the upper temporal vein, was seen. The Wassermann reaction and urine were negative. There was no history or evidence of infection in the tonsils or nasal sinuses; and X-rays and examinations of the teeth and jaws were negative. The systolic blood pressure was 122 mm. of mercury. Upon physical examination, a small cavity was found in the apex of the right lung. It was thought advisable not to use tuberculin in this case, because of the danger of lighting up a latent tuber-

culous focus in the lung, so the patient was sent to a sanatorium for general hygienic treatment. In a letter from the patient, received six months later, he stated that he had gained greatly in general health, and that his vision had improved.

Case 3. This case was reported also by Dr. Edward Jackson (13, case 3) in the same paper as Case 1. In 1915 the patient, a male, aged twenty-five years, had the first hemorrhage in the right vitreous. Six months after the onset he consulted Dr. Arnold Knapp, of New York City, who pronounced the condition tuberculosis and put him on tuberculin. There was temporary improvement, but later a recurrence of activity, with great loss of vision in the right eye. In December, 1916, when he was first seen by Dr. Jackson, V.R.E., moving fingers at 1 foot; L.E., with correction, 1.1. The right vitreous was cloudy; no fundus details were visible. There was a grayish-red reflex in all directions and floating masses, which in the lower temporal vitreous looked almost like detached retina, but no vessels were found. Left eye, slight haziness of vitreous. Choroid rather patchy and "moth eaten," otherwise the fundus was normal. Infiltration of the apices of the lungs, especially the right, was found. Two hemorrhages occurred into the vitreous of the right eye—one in February and the other in April of 1917. The eyes then remained quiet until November 10, 1921, when the vision of the left eye was suddenly obscured in the upper field. He had been free from trouble for so long that he had disregarded his general health and was run down because of overwork indoors. Dr. Jackson referred the patient to me, and I found, V.R.E., light perception; L.E., 0.8. The fundus of the right eye was the same as reported in 1917. The vitreous of the left eye was uniformly hazy. A large, hammock shaped subhyaloid hemorrhage was noted in the lower portion of the eye, extending from a mass of retinitis proliferans on the temporal side, near one of the terminal branches of the lower temporal vein, to a second similar mass along the first branch of the lower nasal vein (Fig. 1). A smaller subhyaloid hemorrhage was seen about 4 d.d. above the nerve head, in the region of a scar which covered a vertical vein. There were hemorrhages into the retina surrounding the masses of scar tissue. The blood absorbed slowly and was replaced, in part, by bands of scar tissue. Tuberculin in small doses (1/500,000 mgm.) was given and gradually increased. December 23, twenty-four hours after the administration of a dose of 1/100,000 mgm. of tuberculin, new retinal hemorrhages occurred. This was a focal reaction, and the size of the dose was diminished. January 13, 1921, V.L.E., 1.1. January 19, during the excitement of making a political speech, contrary to instructions, the vision suddenly became obscured, due to a hem-

Fig. 1.—Retinitis proliferans. Subhyoid hemorrhages. Hemorrhages into the retina.

orrhage into the lower vitreous in about the same location as the former one. The blood absorbed more slowly, and when last seen March 8, there was still some haziness of the lower vitreous and dark blood in the retina around the scar tissue. The patient was ordered to stop work and was sent to a sanatorium, where he could be under supervision. He reported a few weeks ago that he had improved greatly in general health, and that there had been no new hemorrhages.

Fig. 2.—Tortuous and distended veins. Venous hemorrhages into retina. Perivascular exudates and exudates into retina.

Case 4. K.E.F., aged thirty-five years, first seen April 2, 1921. Two weeks before, while walking, the vision of the right eye suddenly became hazy; the vision gradually improved, until April 1, when the vision in the same eye was almost completely lost. The second attack occurred while he was sitting at his desk writing.

There was no history of tuberculosis or hemophilia in his family. He had the usual diseases of childhood without complications. Four years ago he had severe articular rheumatism, which cleared up, and he gained 40 pounds after the extraction of six decayed teeth. About two and one-half years ago he had a severe attack of influenza, but recovered without complications. In December, 1920, he had acute tonsillitis. Since childhood he has had frequent attacks of epistaxis, but has not had bleeding from the nose for several months. He has never suffered from constipation. V.R.E., 0.08; L.E., 1.1. Ophthalmoscope: Cornea and lens clear; vitreous clouded, due to the presence of blood. Only the extreme nasal side of the fundus could be seen. In this portion the upper nasal vein was found to be distended and tortuous, and did not diminish in size toward the periphery, distally to the entrance of good sized contributing branches. In the peripheral portion, two veins were distended and tortuous. They were bordered, for a short distance, by a fine white exudate into which one of the veins finally disappeared. The accompanying artery was obscured by exudate in this region. A small retinal hemorrhage was seen slightly below the area of

exudation. Further to the periphery, numerous hemorrhages of venous origin were seen in the retina. In the extreme periphery, as far forward as one could see, the retina contained a silvery white exudate. The vessels were visible over this portion of the retina, and several small areas of hemorrhage were noted in it (Fig. 2). In the lower portion of the eye, large subhyaloid and vitreous hemorrhages were seen. Left eye: the media were clear. The veins were slightly distended, but showed no signs of disease, otherwise, the fundus was normal.

Blood Wassermann, blood counts, and urine were negative. Systolic blood pressure, 118 mm. of mercury. Coagulation time of blood (capillary tube method), four minutes, twenty seconds. Two apical abscesses were found in X-ray pictures of the teeth. The involved teeth were removed, and the abscesses drained. The surgeon thought the tonsils did not show pathology enough for removal. April 12, V.R.E., 0.1; L., 1.1. The vitreous had cleared slightly, but no further details could be made out. Old tuberculin, 0.005 mgm., was given subcutaneously, with no local, constitutional, or focal reaction. Increasing doses of tuberculin were injected every forty-eight hours until a 5 mgm. dose had been given; no reaction was obtained, and tuberculosis was excluded as the etiology. It was insisted upon that the tonsils be removed, to exclude every possible focus of infection, and potassium iodid and thyroid extract were prescribed.

May 16, the vitreous had cleared considerably since the last examination. The outline of the disc could be seen. A number of small retinal hemorrhages had absorbed. V.R.E., 0.6; L.E., 1.1.

Case 5. G. L., aged thirty years. Family history for tuberculosis and hemophilia negative. He had the usual diseases of childhood and always had suffered from a severe form of constipation. When fourteen or fifteen years of age, the muscles of his legs became weak, and he developed a toe-drop; later this weakness progressed upward, and finally he lost the use of his legs. For a time he had incontinence of urine and feces, but has regained control of the bladder and bowels. X-ray examination of the spine was negative. Tonsils were removed five years ago. About seven years previously he was told that he had some weakness of the eye muscles, and a partial tenotomy of both external recti was done.

About nine months before examination, the vision of both eyes blurred rather suddenly, and he consulted an optician, who gave him glasses (0.50 spheres for each eye) and assured him that his vision would improve if he wore them. The vision gradually improved and almost regained its former acuity. About the same time that the vision began to fail, he had a severe intestinal disturbance which confined him to his bed for several weeks.

The patient had been feeling well, and his eyes had been comfortable until two weeks before consultation, when the vision of the right eye suddenly failed. When first seen, April 15, 1921, V.R.E., 0.03 eccentric; L.E., 1.0. Ophthalmoscope: Right eye; cornea and lens clear; vitreous filled with large masses of blood, which obscured all fundus details. Left eye: Cornea and lens clear; vitreous clear, excepting in lower temporal quadrant, in which location a Y-shaped, white, veil like mass of retinitis proliferans was detected; it extended forward into the vitreous about 7 D., and slightly obscured the details of a branch of the lower temporal vein (Fig. 3). The veins were all slightly tortuous. The upper temporal vein was apparently obscured over a small area by thickened retina and a thin veil of scar tissue, which was located about 5 d.d. from the margin of the nerve (Fig. 4). Beyond the obscured area, the vein was convoluted in the region of a round mass of retinal pigment. A branch of the vein entered the main trunk near the mass of pigment. Following the branch from the main trunk toward the periphery, it was seen to

cross the pigmented area, and a portion of it was covered by pigment. The vein then took a straight course and was bordered on both sides by a fine white streak, apparently a scar. It then suddenly thinned to about half

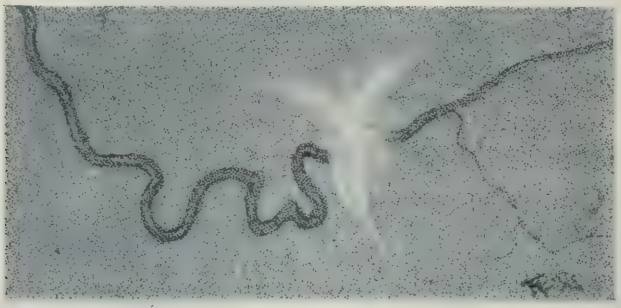

Fig. 3.—Retinitis proliferans and tortuous vein.

of its diameter and became very tortuous. The thinned portion of the vein had several branches: a lower branch of it crossed the main trunk, and its caliber was seen to be very much greater than the vein that it emptied into. Two or three round patches of retinal pigment were seen near veins on the nasal side of fundus (Fig. 5).

Fig. 4.—Irregular and tortuous veins. Retinitis proliferans. Area of retinal pigment changes.

There were no hemorrhages or exudates. The fundus changes were old, probably the result of inflammation which had occurred nine months before. The blood and spinal Wassermann reactions and the urine were negative. The teeth were negative, and nothing was found in the chest. Blood pressure, 125 mm. of mercury. Old tuberculin was given for diagnostic purposes, and no constitutional or focal reaction was obtained after the administration of 5 mgm. subcutaneously. May 6, V.R.E., 0.2, eccentric. The vitreous had cleared quite decidedly, especially in the upper third of the upper temporal quadrant.

This covers a series of five cases of massive hemorrhages into the vitreous; all occurred in males; their ages ranged, at the time of the first attack, from twenty-five to forty-seven years. In all the cases the right eye was the first involved, and the greatest amount of destruction had taken place in it.

In Cases 1 and 3 a focal reaction occurred following the administration of tuberculin, and in Case 2 the man had pulmonary tuberculosis and lost weight just before the occurrence of the intraocular hemorrhage. Cases 1 and 3 improved after the administration of tuberculin, and Case 2 improved with the improvement of his general health. In Cases 1 and 2 there was a visible periphlebitis with patches of white and yellowish exudate in the

proximity of the veins; and in Case 1 these patches were seen to spread along the veins and preceded the hemorrhages. Cases 1, 2 and 3 were due to tuberculosis. In all the cases the veins were tortuous and irregular in caliber, and the peripheral branches were frequently relatively larger than normal when compared with the main trunk. In Case 1, and apparently in Cases 3, 4, and 5, the earlier changes were in the periphery of the fundus in the beginning, before the appearance of hemorrhages. In Case 4, the inflammatory process was most marked in the retina, and in Case 5, there were patches of retinal pigment which was secondary to retinal inflammation. In Cases 4 and 5 tuberculosis was excluded: the possible cause of 4 was focal infection from abscesses at the apices of teeth and infected tonsils. In Case 5 the attacks were associated with severe intestinal disturbance, and the possibility of focal infection from the intestines was considered.

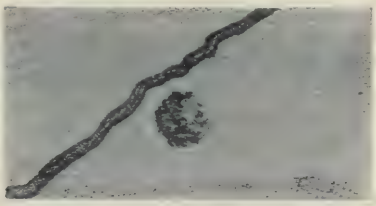

Fig. 5.—Mass of retinal pigment near tortuous vein.

The conclusions derived from the study of the literature and the foregoing cases are:

1. Recurrent hemorrhages into retina and vitreous in young persons is probably not a specific disease.

2. Tuberculosis of the retinal vessels, especially the veins, is one of the common etiologic factors.

(*a*) To prove that the cause is tuberculous, a focal reaction should be obtained.

(*b*) When due to tuberculosis, improvement follows the administration of tuberculin and hygienic treatment.

3. Syphilis is an occasional cause.

4. Focal infection is a possible cause.

5. Hemophilia is not a cause, but might be a contributing factor.

6. The hemorrhages are the result of a localized pathologic weakening of the bloodvessels, and increased blood pressure or exercise are only exciting causes.

7. The veins are usually attacked.

8. In some cases there is involvement of the retina early in the disease.

9. In most cases the earlier changes occur in the periphery of the eye, and if patients were examined in the early stages of the disease, we would learn more about the pathology.

10. Retinitis proliferans occurs in most cases.

11. I believe the disease is primarily in the retina, and that the partial or complete detachment of the retina is due to traction from scar tissue and not to subretinal hemorrhages from the choroidal vessels, as has been suggested.

12. The prognosis is poor; both eyes usually become affected, and in most cases the vision is markedly diminished.

13. The disease is much more frequent in men. When occurring in women, it is usually not so severe.

I have reviewed all the literature that was available and collected 110 cases. This material has been arranged in tabular form (See Transactions Amer. Ophth. Soc., v. 19, p. 248), giving the sex; age of the patient at the time of the first hemorrhage; the etiology; the first eye to become involved; whether the second eye was attacked; and the bibliography.

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CONGENITAL ANTERIOR CAPSULAR CATARACT.

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The history of five cases of congenital anterior capsular cataract occurring in three sisters and two brothers is here given together with the operative treatment resorted to. Read at the Philadelphia meeting of the American Academy of Ophthalmology and Oto-Laryngology, October, 1921.

The interest in this paper centers in that an entire family, consisting of five children, all developed in both eyes congenital anterior capsular cataract; again that in three of the women we found corneal opacities; and that the capsular cataract in two of the women was followed later in life by total lens opacity with subsequent liquefaction of the lens fibers. Again in Case 2, after vision had been restored in childhood by an iridectomy made downward and inward and remained good thruout school life and early womanhood, it was again lost for some six years, probably thru lens displacement, then spontaneously restored only to be again lost because of lens displacement into the iridectomy coloboma. And lastly in the operative measures undertaken for sight restoration.

The following are the case histories of this family:

Case 1. A. V. B., aged 35 years, a resident of Clay, Ky., consulted me May 7, 1914. Father and mother living and have good eyesight. He is married, robust in appearance and the father of a son ten years old with good sight. He has no recollection of ever having had a sore eye. The cornea shows no evidence of previous disease and the pupils react to light. Occupying the central pupillary area, we found a circumscribed whitish opacity lying within the anterior lens capsule but in front of the lens. Surmounting the opacity is seen a small spurlike elevation of clearer consistency and more grayish appearance. Vision: O.D., 15/80 and Snellen D = 1.50; O.S., the counting of fingers at five feet. Ophthalmoscopic examination with plane mirror, after cocain mydriasis, disclosed the lenses transparent and the fundus healthy.

A limited needling of the left lens was made with but slight reaction and at the expiration of six days he left the hospital with instructions to continue the daily use of atropin. On July 20 over half of the lens substance had been absorbed, and he counted fingers at ten feet. A more extensive needling was made, the atropin continued with an ultimate result of vision +12.00 =15/40 and Sn. D.=0.65 with + 16.00. The original capsular thickening remains but is displaced upward under the upper pupillary border.

Case 2. Mrs. N. G., a widow 49 years of age and residence Boxville, Ky., consulted me Dec. 25, 1920. At the age of twelve she was operated upon in Atlanta, Ga., by the elder Dr. Calhoun, who made a double iridectomy downward and inward, establishing vision in the right eye, sufficient for the needs of her school life. Vision in the left eye was not so good. At the age of 25, sight again failed and during the following six years she was unable to read, when spontaneously the sight returned and was preserved until Sept., 1920, when in two days and associated with dazzling and vomiting, she became almost blind.

I found old corneal opacities in both eyes; the iris very tremulous, that of the left likewise discolored. The right lens was wholly opaque, of a putty gray appearance with a central circumscribed capsular thickening from the base of which arose a small pyramidal outgrowth. The lens was displaced downwards and obstructed the iridectomy coloboma. Vision in the eye that of the counting of fingers directly in front of the eye. The left eye presented a dense whitish thickening of the entire anterior capsule, which appears united with the posterior capsule. Of the lens there remained only debris located directly beneath the original capsular thickening upon which is preserved a pyramidal elevation. Vision in the eye is thru a small space between the lower edge of the capsule and the periphery of the coloboma, and is limited to the counting of fingers at five to six feet.

Dec. 27th an opening was made thru the cornea below, and the fluid lens extracted within its capsule. Vision obtained, 15/65 with +11.00 and the reading Sn. D.=0.75 with +16.00. The visual loss is largely due to an old preexisting corneal opacity.

Case 3. Estelle B., unmarried and 35 yrs. of age, consulted me Dec. 13, 1920. In either eye above and below there is an old corneal opacity. She denies ever having had a sore eye. The right lens is opaque thruout with a more circumscribed and denser capsular thickening within the pupillary area upon the base of which rests a small pyramidal spur. Vision is limited to hand movements at a few inches distance. The left eye shows an anterior capsular cataract with some involvement of the anterior lens fibers. Vision, the counting of fingers at twenty feet. The right lens was needled and the degenerated flaky fluid lens evacuated into the anterior chamber. During the succeeding twelve hours decided reaction followed, accompanied by pain in the eye, vomiting and increased intraocular tension to 44 mm., measured by the Gradle-Schiötz tonometer. Linear extraction was made which relieved the pain and tension, and at the expiration of six days she returned to her home.

On May 13, 1921, discission operation with a Ziegler knife and the capsular opacity displaced upward, back of the iris. A visual result of 15/L. with +10.00 sphere was obtained. June 10th she reported that the capsular cataract had dropped down into the pupillary area and obstructed her sight. June 21st thru a linear corneal incision made below, the capsular cataract after some effort was grasped with forceps and extracted and sent to Dr. F. H. Verhoeff of Boston for microscopic examination, who reported the following:

"The specimen is a typical anterior polar cataract of the pyramidal type. Its base is 2 mm. in diameter and its apex is elevated about 1 mm. It consists essentially of a degenerated laminated hyalin mass completely surrounded by a capsule similar to that of a normal lens. The anterior central portion is almost entirely devoid of cells, altho here and there necrotic nuclei may be seen. At the base a considerable number of elongated epithelial cells are present and also a few cell masses. There are here also large deposits of calcium salts. An occasional cell is found beneath the capsule covering the anterior surface of the cataract, and exactly at the apex

there is a small group of epithelial cells which have formed a new capsule around them. These cells are thus in the act of forming another minute pyramidal cataract at the apex of the original one."

An active iridocyclitis followed the capsule extraction with heavy vitreous opacities. By Oct. 3rd absorption of these opacities had progressed to the extent that vision 15/100 is again obtained.

Case 4. Joe B., aged 9 years, consulted me March 1, 1903. He presented in either eye a small circumscribed anterior pyramidal capsular cataract; outside of the capsular thickening the lens is transparent. Ophthalmoscopic examination disclosed below the optic disc, both eyes, a small conus, otherwise no fundus lesion. Vision, 15/50 and Sn. D.=0.50, either eye. Nov. 7, 1920, again examined, the eyes presenting much the same appearance as eighteen years ago. Distance vision still 15/50 but near vision reduced to Sn. D.=1.00.

May 2, 1921, again examined: Vision O.D.,15/100 and Sn. D. =1.50; O. S., 15/16 and Sn. D.=1.25. With the ophthalmoscope it was seen that the underlying lens fibers, especially in the right eye, were becoming more and more opaque. The right lens was rather freely needled and the patient permitted to return home on the fifth day. When last seen in July, absorption of the lens was slowly going on but at least one other needle operation will be required.

Case 5. Mrs. A. M., age 43 years, residence, Owensboro, Ky., was examined April 10, 1919, and found to have anterior capsular cataract, both eyes. She went thru school life without difficulty but during the past three years is aware of sight failure. Vision: O.D., the counting of fingers at 15 ft. improved to 15/100 with $+1.50\bigcirc-3.50$ cyl. ax. 120°; O.S., counts fingers at 15 ft. The eye is highly astigmatic with axis oblique, and not subject to sight improvement with lenses. Both corneas show old opacities, altho she does not recall ever having had sore eyes.

The pathology of congenital anterior capsular cataract is still incomplete. We can accept as partial explanation a disturbance of development of the epithelial capsular lining, but the underlying cause for such disturbance is not clear. It certainly is not the result of misplaced embryonal cells, since no one has reported the finding of extraneous tissue formation within the capsule in these cases. Again it cannot be the result of bacterial invasion of the lens capsule, since this membrane remains unbroken over the opacity, and pathology teaches that bacteria as a rule are incapable of penetrating an unbroken membrane.

Treacher Collins[1] advances a tension theory in explanation for the early stage of capsular opacity. He believes that because of contact between the lens capsule and cornea, the underlying lens fibers undergo shrinkage and break up into hyalin globules and detritus because of disturbed osmosis. Due to this shrinkage, the tension of the capsule at the anterior pole of the eye is lessened and thus the only obstacle to rapid proliferation of the capsular cells is removed.

To me a more plausible explanation is that of invasion of the capsule by a soluble toxin, the result of an inflammation in some part of the anterior portion of the eye, maybe diseased cornea, iris or pupillary membrane. Three of my patients had corneal opacities in both eyes, evidence of previous eye disease. Nor does the fact that both eyes are similarly involved not alone in one member but in others of the family render this theory untenable. We all recognize that interstitial keratitis, the result of inherited syphilis, is prone to involve both eyes, and that it may appear in more than one child. Whether the infection in anterior congenital capsular cataract is likewise of syphilitic origin I have no evidence to offer. The development of the lens begins very early in fetal life, in its fourth week, and until the end of the third month the lens is in close relation with the anterior eye segment, so that disease in this part

of the eye may readily affect the lens and its membrane.

Again the pathologic histology, according to O. Becker,[2] of this affection is similar to that of acquired anterior capsular cataract seen in early childhood after corneal ulceration. The primary response to the toxin is one of focal epithelial cellular proliferation within the capsule in the uncovered pupillary area, with the formation of a cloudy excrescence, that may be flat or surmounted by a small spur like elevation. The capsule, be it remembered, is thinnest at the anterior pole of the lens represented by the intrapupillary area, and readily bulges over an underlying coagulated exudate.

Soon degenerative changes occur, especially in the cells directly beneath the protruding capsule; the cells develop large vesicles, lose their nuclei, break down and take part in the formation of a laminated hyalin excrescence over which the capsular membrane continues unbroken. In the deeper portion of the excrescence the cellular necrosis is not so complete, and there one finds a stratified formation made up largely of spindle shaped cells; while next to the lens, in older cataracts at least, a thin layer of normal epithelial cells may be preserved.

These cells, according to Parsons,[3] are capable of normal functional activity as evidenced by the production of a new cuticular membrane directly overlying them and limiting posteriorly the subcapsular excrescence. In old people it is my experience that anterior capsular cataract may result after circumscribed central corneal perforation, the result of a serpiginous ulcer, but that early and complete lens opacity follows.

The reported finding by Verhoeff of a small group of cells at the apex of the pyramidal opacity that had formed another new capsule around them and were in the act of producing another minute pyramidal cataract, is not only unique but interesting. It is my belief that these cells came from original peripheral capsule cells and were excited to proliferation thru the reaction that followed the first needle operation; since Arlt[4] states he found no cells in the outer two-thirds of the opacity in a case of anterior capsular cataract examined by him. In addition to vesicular degeneration, we find molecular fatty and calcareous degeneration and at times cholesterin formation, especially in the deeper and older portions of the excrescence. The lens fibers immediately underlying the capsular opacity sooner or later in many cases undergo cataractous degeneration with excavation.

Operations: Is it preferable to do an iridectomy or a discission operation, and what should influence us in making a choice? Where vision is decidedly better after mydriasis and it is reasonably certain that the capsular opacity will not be followed later in life by extensive lens opacity, the advantages of retained accommodation, especially in the child, should influence one to do an iridectomy. However, I know of no way of foretelling that the lens will not later in life become cataractous and because of this, if an iridectomy is made, I should prefer to do it above rather than below. Of course the amount of vision we hope to establish should not be left out of consideration in determining the site. In adult life, where glasses must soon be resorted to for near work, I should prefer to do a discission operation. It is almost needless to add in persons where the capsular cataract is small and interferes but little with sight, nothing should be done in the way of an operation.

1. Collins and Mayou. Pathology and Bacteriology, International System Ophthalmic Practice.
2. O. Becker. Graefe-Saemish. Handbuch der gesammten Augenheilkunde.
3. Parsons' Pathology of the Eye, Vol. 2.
4. Arlt. Histologie des Auges.

NOTES, CASES AND INSTRUMENTS

APPARENT PITUITARY TUMOR WITH RESTORATION OF VISION.

WALDRON A. CASSIDY, M.D., and SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

Mr. E., a man of 34, was seen in Dr. Harold Gifford's office December 2, 1918. He complained of failing vision in his right eye for the past six months, in the left eye for the past six weeks. For several weeks, he had been subject to headaches, with nausea. Vision was: Right eye, shadows; left eye, 20/200, not improved by lenses. The fundi were normal. The field was, as shown in the figure, not typical of pituitary tumor. The patient's whole appearance, however, was that of an acromegalic. The superciliary ridges were very prominent, the nose large and heavy, the lower jaw prognathic. The hands were large and heavy, with clubbed ends, and the feet were long. He had noticed a change of physiognomy in the last year. X-ray showed a sella obliterated and its site occupied by a shadow which the radiographer interpreted as probably a tumor, involving a large area of the neighboring brain. Nose and throat examination was negative. The patient stated that Wassermanns performed on his blood and spinal fluid a few months before at the Mayo Clinic had been negative, and that he was told there was evidence of a brain tumor in his case. As he refused all thought of operative interference, the patient was sent home, and told to take five grains of thyroid extract daily, under observation of his family doctor.

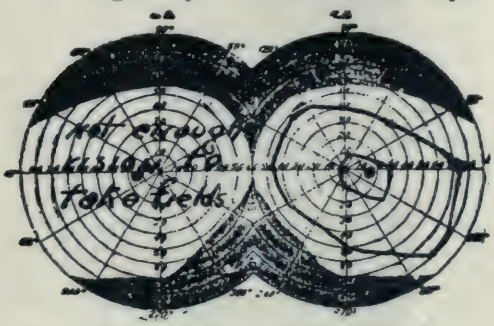

Fig. 1. Fields of vision, Mr. E., 1918, Dec. 2.

He was lost track of until May 14, 1921, when he returned to report his good condition. He stated that vision had begun to return soon after he returned home. He had taken thyroid regularly for a year, and since then irregularly, resuming it whenever he was warned by a slight headache. Examination at this time, two and a half years after his first visit, showed vision 20/20 in each eye, with fields as shown. The fundi were normal. While the general appearance showed no change in essential landmarks, his appearance was healthy and he stated that, except for occasional headaches, he had been in perfect health for the past two years. He was told to continue thyroid two weeks out of every month. Another X-ray could not be obtained at this time.

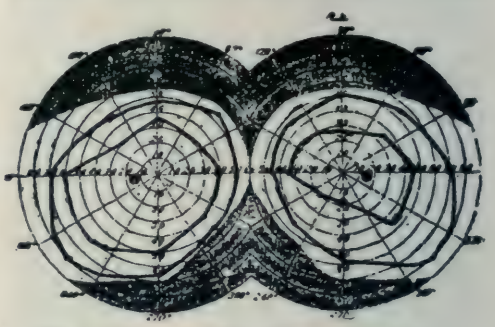

Fig. 2.—Fields of vision, Mr. E., 1921, May 14.

To the question: "Did this patient have a pituitary tumor?" of course no definite answer can be given. Certainly all the signs except the field pointed to a tumor in the neighborhood of the pituitary. No more definite conclusion can be reached as to the effect of the thyroid extract. Tho apparent improvement has followed its use in many hands, the basis of such treatment is still empiric. Cases of spontaneous rupture of a cyst have been reported, and on the whole, this seems the most likely explanation of the course in our case.

It seemed worth while to report this case as a reminder, in giving a prognosis, that recovery, or at least lengthy remission, may occur without operation in patients presenting this syndrome.

RECURCING MYXOSARCOMA OF ORBIT.

J. H. Buckley, M.D.

FORT SMITH, ARK.

Mrs. L., age 38. In January, 1918, pain of much intensity began in the upper jaw and upper teeth, followed by an inflammatory condition of left eye. On January 24th she consulted an oculist. A Wassermann was negative, and X-ray showed nothing. A general surgeon advised removal of eye ball. A small hardness could be felt just under roof of left orbit. This was removed by her oculist May 27th, 1918, and a specimen sent to St. Louis. Laboratory report, a nonmalignant inflammatory tissue.

Fig. 1.—Recurrent orbital tumor. (Buckley's case.)

Fig. 2.—Result of removal of tumor and plastic operation.

During the last week of August, 1918, she came under my care, at which time the eye and surrounding tissues were quiet, but the globe protruded one-fourth of an inch, and a firm hard mass could be very definitely palpated upon the floor of the orbit. On Sept. 2nd, 1918, I removed this mass. It was one-eighth of an inch thick, one-half inch wide and three-fourths of an inch in the anteroposterior diameter, extending back of the equator of the ball, which caused the protrusion. Laboratory report of this speciman myxosarcoma.

The wound healed by first intention, and the eye resumed its proper place within the orbit. In March, 1919, I refracted this woman, prescribing a plus three-quarter diopter sphere for each eye. June 13th, 1920, she visited me on account of a mild iritis and bulbar conjunctivitis of right eye. Responded nicely to treatment, but would occassionally "light up" again.

August 10, 1920, she went to one of the Carolinas on a vacation. Soon after reaching there she noticed a small tumor above the right eye. When she reached home in September, the eye was closed and she was unable to open it. The ball was pushed forward fully three-eighths of an inch. The accompanying cut gives an excellent idea of the appearance of a front view. The half-tone also shows both upper and lower tumors pushing forward the skin in front of them (See Fig. 1).

On September 23, 1920, I removed these tumors. Incorporated in the upper tumor was much of the elevator of the upper lid, and some of this muscle was necessarily removed with the upper tumor. The upper tumor lay between the eye ball and the roof of the orbit. These tumors were of a dirty white color and in consistency quite hard, the same color and density as the tumor I removed from floor of the left orbit two years before. Both these tumors according to laboratory report were myxosarcomata. The upper tumor measured one-half inch anteroposterior diameter, one-half inch wide and three-eighths inch thick. The lower tumor three-fourths inch anteroposterior diameter, one-half inch wide and one-quarter inch thick.

After all inflammation and reaction

subsided, the eye resumed its position in the orbit. The complete ptosis, however, remained. I made a flat tongue of skin from the upper lid running the same thru a tunnel under the eyebrow, and attached it to the occipitofrontalis muscle, and the accompanying cut shows the results which are very satisfactory to the patient. She can open and close either eye separately or both simultaneously. (See Fig. 2.)

This is quite interesting and especially so since the woman had three separate and distinct myxosarcomata. She had occasion to phone me about two weeks ago about another matter, and volunteered the information that both her eyes "are fine."

CHART FOR TESTING VISION OF CHILDREN AND ADULTS—LITERATE AND ILLITERATE.

G. A. Sulzer, M.D., F.A.C.S.

COLUMBUS, OHIO.

This chart is composed of two columns of three minute characters, varying in size from one hundred to five meters in the left hand column, and from eighty to four meters in the right hand column. Either column may be used to quickly determine the vision for distance. On reaching the seven meter characters, the patient will find a very great difficulty in memorizing them, as sixteen characters have been arranged in the form of a square, making possible twenty different directions in which they may be read. (See p. 209.)

The sizes of six, five and four have been made in the same way, making a very practical series for finer subjective tests of the refraction of the eye.

A small hand card to measure the accommodation accompanies the large one, making a complete series from one hundred to thirty eight hundredths meters, all of the same angle and form. These cards have been in practical use for several months to the exclusion of letters, and have given great satisfaction to the designer. A little patience will be rewarded by more positive results in subjective refraction.

In reading the characters, the patient is asked to state the direction of the opening; whether to the right, left, up or down, or to the right and up, right and down, left and up, or left and down. The diagonally placed characters assist in the detection of slight astigmia, as well as the determination or proving of the axis. The charts may be universally used—in the office, clinic, factory, school, army and navy, in any and every country, for persons of all nationalities and even to test deaf mutes. Finally it must be recalled that this character, first suggested by Dr. Jackson, is essentially similar to the official, broken ring test developed by Landolt and adopted by International Committee of Ophthalmologists appointed for that purpose.

ONE ADVANTAGE OF SINGLE VISION.

Edward J. Brown, M.D.

MINNEAPOLIS.

The title of this paper might be The Advantage of Having But One Eye. Of course there can be but one advantage of such a condition, and that is freedom from the effort and strain involved in binocular single vision. My attention was especially called to this matter a few months ago when I succeeded in examining the eyes of a very cranky old man whom I had had for an ear patient many years, but whose eyes I had not been afforded the opportunity to examine. Such examinations as I have been able to make have been either incomplete from my own lack of appreciation of field and blind spot determinations in the early years, or from the man's obstinacy.

He is now nearly 88 years of age. When a child he had convergence of the right eye, and in his late youth the internal rectus of the eye was tenotomized by a rural oculist or surgeon. In 1913 when he was 78 years of age,

DR. G. A. SULZER'S CHART FOR THE ACCURATE TESTING OF VISION AND FOR THE FINER DETERMINATIONS IN SUBJECTIVE REFRACTION.

he had been wearing for years R. plus 5.50 and L. plus 4.50 for reading. I found:

R. +3.50⌒+0.25 c. 90°=20/70, L. +2.50⌒+0.25 c. 90°=20/20. Add +2.50, J. 1. Muscles: R. H. 1°, Esoph. 0, at 13 inches, Exoph. 17°, *Diplopia at 20 feet with refractive correction.* Images brought to near fusion with prism 4° base in. *He was given near correction only.*

A late examination is as follows: R. + 3.50⌒+0.50 c. 180°=20/50, L. + 2.⌒+0.25 c. 180°=20/30, + 3., J. 1. Esophoria 16°. The corneas anesthetic, anterior chambers shallow, pupils 2 mm., normal reactions, dilate quickly to 5 mm. with one drop of 1% cocain. There are peripheric striae of the right lens, both discs are moderately cupped, and tension seemed about normal, 25-30 with Brown tonometer. The blind spots could not be demonstrated. The form fields were almost entirely normal, even the color fields much better than I often find them in comparatively young people. So far as I have been able to examine other cases with squint or one blind eye, the results have strongly corroborated the findings in the above case, that the absence of muscular strain has been a safeguard. Such results are also in corroboration of my often repeated thesis, that the one great and universal cause of chronic simple glaucoma is eye strain.

TRANSPLANTATION OF ENTIRE VERTICAL RECTI FOR ABDUCENS PALSY,

RODERIC O'CONNOR, M.D.

SAN FRANCISCO, CALIF.

In a paper on Transplantations of Ocular Muscles read at the 1921 Colorado Congress, I suggested (A. J. O., v. 4, p. 839, Nov. 1921) that transplantation of the entire vertical recti for abducens palsy would, by relieving tension on stitches, give better results than transplantation of the halves of these muscles. Since that date I have had one such case with perfect results which I wish to report.

Miss D. O., 13 years. Congenital abducens palsy. No outward rotation. Tests esophoria 20°, with left eye deviating downward 10° because of moderate left superior rectus paresis. Vision 20/20 each eye.

August 18, 1921. Operation according to figure 1 in the paper mentioned. The technic was extremely easy, the muscles laid over in their new locations with no pull whatever. Healing was prompt and uneventful. Outward rotation began to appear early and gradually increased until at this date (Nov. 26, 1921) the patient presents the following conditions:

Outward rotation 30 degrees of arc as measured by tropometer.

Cosmetic appearance perfect except in rotation to left when the affected eye shoots down and diplopia appears.

In primary position tests esophoria 1 degree.

Binocular vision of third degree tested by amblyoscope in ordinary reading position.

Converges to 3 inches on test light, keeping pupillary reflections symmetric.

Diplopia. None, except when looking to the left. She avoids this easily by head position.

In looking up the left eye lags, for which further work on that superior rectus is being considered but she uses her eyes so comfortably in all the ordinary positions that I may decide to "let well enough alone."

Finally I wish it to be remembered that in the operation the internal rectus was not even partially cut nor was the external shortened. I wished to find out just what could be secured by transplanting the vertical recti in their entirety.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, SECTION ON OPHTHALMOLOGY.

October 20, 1921.

Dr. G. Oram Ring, Chairman.

Development of the Lacrimal Canal in Normal and Abnormal Conditions.

Professor J. van der Hoeve, of Leiden, Holland, (by invitation) showed with lantern slides how the lacrimal ducts develop, according to the researches of Jouves, Matys, Contunni, Moneri, Schaeffer, Fleischer, and especially Ask. In the early period of fetal life, an island of epithelium is separated from the upper nasal part of the depth of the nasolacrimal groove. From this island sprouts develop, which grow up and down as solid cords—the nasolacrimal ducts and the lacrimal canals, which acquire a lumen at a much later time. In acquiring a lumen sometimes a part of the duct remains solid, and especially this may be the case with the nasolacrimal duct at the entrance in the nose, causing congenital atresia with subsequent dacryocystitis in newborn. Nature itself usually cures the condition spontaneously, but it must be treated by pressing on the lacrimal sac about every half hour; if, in the lapse of two weeks, the obstruction is not relieved a small probe must be passed. If the obstruction remains, it may give rise to an incurable and disagreeable dacryocystitis.

The lacrimal ducts grow out to the lids, and reach the free margin when the fetus is thirty-five mm. in length. The superior canal is the shorter, and inserts in the nasal angle. To reach the lacrimal lake it has to push away the anlage of the Meibomian glands, so that those glands in the upper lid, especially in its nasal part, are much closer to each other than in any other portion of the eyelid. They may overlap one another, as van der Hoeve showed in lantern slides of reconstruction by Ask. The lower duct in reaching the free margin of the eyelid cuts away part of the lid, with Meibomian and other glands, and the caruncle lowers itself and takes a position opposite to the lid, in the semilunar fold. The caruncle is thus formed by the lower lacrimal duct—without the duct the caruncle cannot develop.

This idea of Ask accounts, according to van der Hoeve, for a congenital aberration which he perceived in three patients. All had a nasal ankyloblepharon. The distance from the outer canthus was normal, but the inner canthus was 10 mm. larger than in normal persons of the same age, so that the eyelids were 5 mm. smaller than they should have been. The superior lacrimal point was present at its normal place, close to the abnormal internal canthus; the inferior lacrimal point, on the contrary, was just as far from the abnormal internal canthus as it ought to be from the normal, about 5 mm., consequently it did not dip in the lacrimal lake and the patients suffered from lacrimation. This condition can be explained by a congenital development. The anlage of the inferior lacrimal canal was too large, consequently a too big caruncle was separated from the lid, and this caused an irritation which made the lids grow together (ankyloblepharon).

There are authors, as Krischewiky, Halben, Kuöl, Krämer, and Depené, who believe that the epithelium of the free lid margin takes an active part in the formation of the canals, in that the entire canal, or at least a part, develops from the lid epithelium. One of the reasons which they give is the fact that in cases of coloboma palpebrae, sometimes of the inferior lid, the lacrimal point is found at the temporal side of the coloboma, and they reason that such would be impossible if the canals develop from the nasal side of the coloboma—they could not have crossed the coloboma. This seems to van der Hoeve to be poor reasoning, because

the canal can grow around the gap, as is shown in one of those cases where fluid, instilled in the inferior punctum, reached the nose, so that as the canal developed, it had grown around the coloboma. Van der Hoeve mentioned a patient, with an open oblique facial cleft from the interior eye angle to the mouth, which latter cut all the soft tissues to the bone, so that it was impossible for the canal to grow around it, and still the inferior lacrimal point was at the temporal side. Pressure on the sac produced mucopus in the nose and in the cleft. Irrigation in the superior lacrimal point gave fluid in the nose and in the cleft, in the inferior point only in the cleft, so that it seemed that a normal lacrimal apparatus was present in which only the inferior canal was cut thru by the cleft, which was proved by examination with the Roentgen rays.

Van der Hoeve referred the subject to Ask, and he made slides from a fetus of 35.5 mm. long, which he got from Bowman's laboratory, and he was so lucky as to get cuts which proved that the canals reach the free margins of the lids without the epithelium of the lid being active in any way. To explain the condition in the child it was possible that: (1) The "anlage" of the lacrimal apparatus is double at both sides of the nasolacrimal groove, and grows together when the groove closes; if it remains open both parts develop independently. (2) The influence which prevents the cleft from closing causes a part of the anlage to come to the other side. (3) The temporal part has really grown down from the lid epithelium or up from the cleft epithelium. All these suppositions were impossible, because the caruncle would have been where the inferior canal was, at the temporal side, whereas it was in its usual place at the nasal angle. This fact could only be explained by a normal development of the lacrimal ducts and a cutting thru of the inferior canal by a secondary cleft. Therefore, van der Hoeve ventured the hypothesis that in this case the ducts had developed in the normal way, and that afterwards a secondary cleft had developed caused by amnion bands, which had vanished entirely. We know that van Duyse and others explain many of the secondary open facial clefts by the action of amnion bands.

But, if this is right, then we must have a great many possibilities according to the time and place where the cleft develops. Ask and van der Hoeve built up a scheme of these possibilities, and divided them in four parts:

(1) Cleft is temporal to the anlage of the lacrimal punctum, so does not interfere with the apparatus or only cuts thru the lacrimal duct.

(2) Cleft is thru the anlage; if this happens before the sprouts are grown out, (about the sixth week of fetal life) we will find no lacrimal duct, caruncle, or sac; if the cleft develops later we find ducts and caruncle, but no sac.

(3) Cleft interferes with the lacrimal canals, either with the upper, the lower, or both. If this occurs early, before about the sixth week, when the duct has not as yet passed the dangerous spot, we find no lacrimal punctum; if it concerns the lower duct no caruncle either; when it occurs later the duct has passed the dangerous place, and we find a normal canal and punctum, but cut thru by the cleft. The inferior canal can end in the cleft or in the inner angle, nasal to the cleft, so that no space is left for a caruncle. Had the inferior canal already passed the dangerous place, it may end so close to the cleft that no caruncle is present, or so far that a caruncle is formed. The caruncle is formed when the canal reaches the free margin, about the tenth week of fetal life, then the caruncle goes to the interior angle and reaches its normal place about the fifth to the seventh month. If the cleft develops after the sixth week, and before the fifth to the seventh month, the caruncle cannot reach its place and remains either at the temporal side of the cleft or is cut thru in two pieces, one nasal and one temporal to the cleft, or is destroyed totally by the cleft. If

the cleft develops after the fifth to the seventh month, the caruncle is in its place, and the cleft only cuts thru the inferior canal as in the child, which was the beginning of these reflections.

(4) The cleft is temporal of the canals, and either does not touch at all the lacrimal apparatus or cuts thru the nasolacrimal duct. We can increase the amount of these possibilities *ad libitum* by making combinations of different disturbances of canals and nasolacrimal ducts. Ask has found a fetus with open horizontal facial cleft at the right side, thru which the amnion ran. It was caught in the mouth and went up over the left side of the facies and cut in this an oblique cleft, separating the eye and the eyelids in two parts, so that macroscopically the inferior lacrimal punctum and the caruncle were at the temporal side of the cleft. Microscopically he found that a small part of the caruncle was at the nasal side of the cleft, the caruncle was cut in two pieces by the amnion bands. This demonstrated van der Hoeve's hypothesis. The latter found in the anatomic museum in Amsterdam, under Director Professor Bolk, three feti. First specimen, placenta connected to the head, nose cut thru by the amnion bands, lacrimal ducts normal (Scheme part I). Second specimen, normal inferior ducts and caruncle, superior canal ending at the left side in the cleft, at the right side in cicatricial tissue, which destroyed the upper lid (Scheme part III). Third specimen, a fetus with no lacrimal ducts on one side (Scheme part II). At the other side a normal superior lacrimal canal, no inferior lacrimal point and no caruncle (Scheme part III).

The important conclusions of Prof. van der Hoeve's paper were:

(1) Ask's investigations of the development of the lacrimal caruncle explain some congenital aberrations.

(2) Most often facial clefts are of secondary nature, and caused by amnion bands.

(3) It is possible to point out by appreciating the conditions of the lacrimal canals, the nasolacrimal ducts and the caruncle, the time in which the amnion bands have exercised such an influence that they formed impassible barriers for the lacrimal ducts or the caruncle.

Discussion.—Dr. J. Parsons Schaeffer said that he thought Professor van der Hoeve had given a suggestive, if not acceptable, basis for a small group of anomalies that have hitherto puzzled investigators in this field.

In a paper read before this Section in March last on "The Modern Conception of the Nasolacrimal Passageways in Man," Dr. Schaeffer considered the normal development of the channels from a solid cord of epithelial cells which early begins to grow (32-day embryo) from the epithelium lining the depth of the obliterated nasooptic furrow, becomes detached and sinks into the underlying mesenchyme. Under normal conditions this solid cord of epithelial cells surrounded by mesenchyme, sprouts at both the ocular and nasal ends, the ocular sprout giving rise to the upper and lower lacrimal ducts, while the nasal sprout establishes connections with the mucosa of the inferior nasal meatus. A lumen is variously established in the solid mother cord and its secondary outsprouts, ultimately resulting in patulous channels from the free borders of the eyelids to the inferior nasal meatus. The last part to become patent is the point of connection of the nasolacrimal duct with the inferior nasal meatus—the lacrimonasal membrane disappearing about term.

At the same time he discussed the various rudiment potentials and the possibilities of abnormal development and the development of anatomic types: At times multiple secondary sprouts are encountered. These readily account for supernumerary lacrimal ducts to one or both eyelids. Wide points of contact with the free borders of the eyelids can readily result in multiple lacrimal puncta, or if the wide point of contact becomes entirely canalized, the slitlike punctum results. The marked variations in the anatomy

of the aperture of the nasolacrimal duct in the inferior nasal meatus is accounted for by the fact that the point and type of contact of the embryonic solid nasolacrimal cord with the mucous membrane of the inferior nasal meatus is inconstant. At times the point of contact is at the highest part of the inferior nasal meatus, giving rise to the wide and permanently open mouthed ostium, unguarded by a mucosal flap. Again, the point of contact is extensive along the lateral wall of the inferior nasal meatus, this resulting in multiple apertures or a single slitlike aperture guarded by a mucosal flap (valve of Hasner), etc., etc.

The solid nasolacrimal cord instead of presenting an even contour not infrequently has protruding from it short, solid sprouts (the usual ocular and nasal sprouts mentioned before). He believed that these secondary sprouts or buds are in many instances potential rudiments of nasolacrimal duct diverticula which are encountered in the adult. Indeed some grow to become additional lacrimal ducts. Very many are early resorbed. Lumen formation of the solid epithelial cords occurs very irregularly, accounting for mucosal flaps and ledges within the nasolacrimal duct later. Atresias here and there of the duct may be the result of retention of an embryonic condition; always recalling that the nasolacrimal passageways are at one time solid epithelial cords.

It is, therefore, clearly obvious that the genesis of certain variations or anomalous states is to be found in rudiment potentials. Other variations, like absent nasolacrimal ducts for one or both eyelids, in whole or in part, result from an arrested development. The causes here may be intrinsic or extrinsic, probably the latter. They are not clearly defined in this connection. Moreover, rare variants doubtless are the result of phylogenetic retention of a more primitive anatomy.

Despite the foregoing there are a few anomalous states in the anatomy of the nasolacrimal passageways encountered that appear to have no basis in rudiment potentials, in arrested development or in comparative anatomy. For examples, one now and then encounters a divided lacrimal duct for one or both eyelids, the lacrimal sac may be detached from the main nasolacrimal duct, the nasolacrimal duct proper may be found as two discontinuous segments, etc. It appears certain that the division of a lacrimal duct, or of the nasolacrimal duct proper, occurs secondarily, that is after the definitive connections are fully formed. In his former communication he spoke of the possibility of amniotic bands severing previously formed and continuous nasolacrimal passageways into secondarily discontinuous segments. Owing to the want of suitable material to substantiate his belief, he was unwilling at that time to hazard further discussion of them.

The researches of Ask on the development of the lacrimal caruncle are generally accepted as correct. Professor van der Hoeve and his coworker Ask have ingenuously used the developmental stages of the lacrimal caruncle in offering an interpretation of the obscure anomalies in question. The inferior lacrimal duct, for example, wholly grows from the mother cord of epithelial cells. When division of the duct in question into two discontinuous parts is found, some writers use it as an argument that the distal part of the lacrimal duct grows as an epithelial sprout from the free border of the eyelid, and the proximal segment from the nasolacrimal duct proper.

It seems reasonably certain from the work of Ask and van der Hoeve that if a fissure is the cause of a division of the lacrimal duct into two parts, the fissures or furrow must be a secondary one. The nasooptic furrow is obliterated before this time; indeed is in a very rudimentary state at the appearance of the very beginning of the nasolacrimal passageways (32-day embryo). The explanation for the fissure may be found in amniotic bands, and what before was mere conjecture and speculation now appears to have received strong support. Professors

van der Hoeve and Ask not only present a theory, but to-night one of them has shown illustrations from actual tissues and patients in confirmation thereof. As to the question of time raised by Professor van der Hoeve, Dr. Schaeffer's belief was that division of the ducts occurs early. Unfortunately, most of the specimens shown this evening were from monsters. This would indicate, according to the studies of Mall and Stockard, early faulty environment of the embryo. Mall also shows that the vast majority of human monsters are aborted before the sixth week. This may account for the relative infrequency in the newborn and child of the anomalous nasolacrimal ducts discussed tonight. It has been shown that pathologic embryos that survive the eighth week very frequently continue thru the normal period of pregnancy, and will be monsters at birth. Fortunately, Nature early gets rid of the majority of such undesirables. While additional studies should be made, Professor van der Hoeve's is the first plausible explanation for a certain and infrequent type of anatomic defect or variation that was unaccounted for hitherto.

Senile Changes of the Optic Nerve.

Dr. Ernst Fuchs, of Vienna, First of all I beg to thank the Ophthalmological Section of the College of Physicians for the honor done me by the invitation to read a paper before you. The subject of the paper is the senile changes of the optic nerve, especially in so far as they are capable of damaging the vision. One meets now and then with cases of reduced vision in old people, either without any ophthalmoscopic changes, which could account for it, or maybe with a slight pallor of the optic disc. If this could not be attributed to some manifest cause, I used to describe it as senile atrophy and considered it as a benign form, insamuch as it never resulted in complete blindness.

In order to know what senile changes may occur in the optic nerve, I removed during the last few years in the postmortem room from the bodies of persons over 70 years old the eyeballs together with the optic nerves, the chiasm and the optic tracts, and examined them in serial sections. The senile changes found in these cases were of these classes.

1. *Amyloid Bodies.* They are very often confounded with the *arenaceous* bodies. The arenaceous bodies originate from the endothelial cells lining the arachnoid sheath of the optic nerve, and are therefore found in the intervaginal space. They exhibit a laminated structure and are many times larger than the amyloid bodies. The latter are of a homogeneous structure, and owe their name to their staining with certain stains in the same way that starch does. There is a pretty general consensus of opinion, that they develop exclusively from neuroglia, so that they are found only where the supporting tissue is formed by neuroglia, i. e., in the central nervous system. There we meet them without exception in all old persons altho in a varying degree of frequency. The optic nerve being an advanced part of the brain, they must be expected to be present also in it. Now one never finds them in that part of the optic nerve which remains with the excised eye and which is mostly the only portion of the optic nerve examined. Obersteiner, however, has shown that they are quite frequent in the intracranial portion of the nerve. There I found them sometimes in great numbers—in one case more than 1500 in each cross section of the nerve, being equally numerous also in the chiasm and in the optic tract. But at the entrance of the optic nerve into the optic canal their number decreases very suddenly, and in the orbital division but a few may be found, and then only in the posterior part of it. If they are as numerous as in this case, their entire number in the optic nerve, chiasm and optic tract together may be estimated as several millions. Now the diameter of these bodies is so great that it occupies the space of 8-13 fibers of the optic nerve, which are pushed aside by the bodies. If they are so abundant in the above case, each fiber must be dis-

placed several times by the bodies it meets on its way and may so become damaged.

2. *Sclerosis of the vessels.* This was present in a varying degree in all cases examined and was very advanced in some of them. The internal carotid artery, and, branching from it, the ophthalmic artery are seated at the inferior side of the intracranial portion of the optic nerve. These vessels are often dilated and their walls thickened or even calcified. Then they exert a pressure upon the lower side of the optic nerve, which, however, is prevented from giving way by the pressure of a very tough fold of the dura mater, which extends from the upper circumference of the posterior orifice of the optic canal backward so as to form a sort of prolongation of the canal, so preventing any upward displacement of the nerve. Therefore the pressure of the ophthalmic artery effects a flattening on the lower side of the nerve or even a depression, which in some cases becomes so deep as to divide the nerve into two separate parts, the nerve bundles between them becoming completely destroyed. This determines a loss of the nasal half of the field of vision, and if the lesion is bilateral, a binasal hemianopsia, which therefore, if it occurs in old people, is indicative of a damage done to the optic nerves by a sclerosed ophthalmic artery.

3. *Atrophic foci.* They can be recognized as such already in an early stage in sections stained by Weigert's method, in which the focus stands out by its lighter color because of the disappearance of the medullary sheaths. Later on, the axis cylinders also perish, the entire nerve bundles become smaller and smaller, and in proportion the septa between them thickens, so that in advanced cases they may coalesce. If as usually happens, the focus is located at the periphery, the nerve flattens out at the site of the atrophy. I have found such foci of atrophy in nearly all nerves examined, often two to four in one nerve. Most of the foci occur in the division of the nerve, which lies in the optic canal, or near its anterior or posterior orifice. The size of the foci varies; some may be so large as to occupy nearly one-third of the thickness of the nerve and may attain a length of 5 to 10 mm. The atrophy is always most advanced at a definite point, from which it extends upward and downward, the ascending atrophy being always 3 to 4 times longer than the descending. As to the cause of the atrophy, it could not be the disease from which the persons had died, as these diseases varied greatly in character in my cases. There was only one morbid change common to all cases, namely the arteriosclerosis, which therefore I take to be the cause of the foci of atrophy. Behind the entrance of the central artery, the nerve is supplied with blood by small arteries, which penetrate from the pial sheath into the nerve together with the connective tissue septa. These arteries are terminal vessels, so that if they are obstructed by sclerosis, the blood supply becomes insufficient. Then the delicate nerve fibers perish, whereas the more resistant connective tissue of the septa survives.

As the atrophy attacks as a rule the peripheric bundles, it ought to manifest itself by a peripheral contraction of the field of vision. This, however, may easily remain unnoticed by the patients, especially if their vision is already impaired by other changes due to old age.

Discussion.—Dr. Edward Jackson, of Denver, said: In expressing high appreciation of the address Professor Fuchs has made to us this evening, I can safely claim to speak for every one who heard him. Heretofore when an elderly patient showed deteriorating vision, without any recognizable cause for the visual impairment, we have called it "senile amblyopia," and rested quite satisfied with the diagnosis. The discovery of the corpora arenacea in the intracranial portion of the senile optic nerve, gives a new definiteness to our conception of senile failure of vision, and the starting point for additional researches as

to the etiology and possibly the prevention of such changes.

Such results of painstaking research carry the lesson which we American ophthalmologists most need to learn; that careful studies in pathologic histology still need to be made with reference to many conditions; and promise results that will revise and advance our conceptions of disease, and bring about practical modifications in prognosis and treatment.

CHARLES R. HEED, M.D.
Clerk.

ROYAL SOCIETY OF MEDICINE, LONDON.

SECTION OF OPHTHALMOLOGY.

Friday, December 9, 1921.

President, DR. JAMES TAYLOR, C.B.E.

Hyalin Bodies in Disc, with Night Blindness.

MR. MALCOLM HEPBURN showed a patient with this condition of hyalin bodies in the disc, the interesting feature being the associated night blindness. Sometimes these bodies were seen with pigmentary degeneration of the retina, but in this case there was none of the latter. Possibly there might be retinal degeneration without pigment, but in all cases of such degeneration there was a ring scotoma, and this case had not one. The fundus was of the albinotic type, and his brother, who was under the care of Mr. Treacher Collins at Moorfields, had a similar kind of fundus. The exhibitor had never yet found the symptoms of night blindness in an albino. The patient was also a myope, and true night blindness was sometimes found in myopes. The night blindness in this case he regarded as a coincidence.

Macular Mass for Diagnosis.

MR. C. LONGWORTH BLAIR showed a man with a mass at the macula, of uncertain nature and origin. For 2 1/2 years there had been difficulty in seeing with that eye.

Discussion.—MR. RAYNER BATTEN mentioned a case of his own in which there was a mass in the middle of the macular region, and it definitely followed scarlet fever and ear trouble. During the year he had been watching the case, there was no increase in the size of the mass; indeed the retina had latterly been more healthy looking. He thought it was inflammatory, also Mr. Blair's case.

MR. J. H. FISHER thought there was little evidence of inflammation, but that there was a cystic element in the case.

MR. M. S. MAYOU spoke of a case with a similar appearance he had now under care, a child aged 12, who had a good deal of keratitis punctata, and there were enlarged tubercular glands in the neck, proving the case to be inflammatory, and as such he regarded Mr. Blair's case.

Cyst of Iris.

MR. R. R. CRUISE showed a case of this nature, as to which there was no history ascertainable as to inflammation or injury. His inclination was to regard it as a retention cyst associated with crypts towards the base of the iris, the crypt mouths having become occluded by the continued secretion which was not being evacuated. There was an opacity of Descemet's membrane, giving to the limbus a greyish haze. The stroma of the iris seemed to be excavated, and the base of the cyst seemed to be formed by the posterior layer of the iris. The tension of the eye was normal, and there were no signs of synechiae. It was a flattened pupil. It was necessary to think of possible increase of tension caused by the fluid, and he invited advice as to operation. There were no fundus changes to be made out.

Discussion.—MR. W. H. MCMULLEN reminded members of a case of cyst of the iris which he showed 18 months ago, with very clear contents. There was no history of injury in that case either. The condition appeared to have dated back to infancy, when the child had a cyst removed at a hospital, and it subsequently recurred. At the

meeting referred to it, was suggested that the child might have received a puncture wound in the eye from a secreted pin in the pillow. Cases had been seen in France in men who were exposed to fragments from exploding shells. The case he referred to was still in practically the same condition. He advocated leaving these cysts alone, because of the risk of conveying the epithelial cells where they would be a danger; moreover, if the cyst was not obviously growing, it did not seem to do any harm.

Mr. M. S. Mayou thought the difficulty was that when the cyst collapsed, the edges came together again and formed a fresh cyst round the margins of the old one. In one case, the eye of which he examined in the pathologic department, operation had been done and very acute iridocyclitis followed. For this the patient did not come to hospital, and sympathetic trouble developed in the other eye, and it went quite blind. In another similar case the eye had to be removed. He agreed with Mr. McMullen that they should be left alone.

Mr. Hine mentioned a similar case of his own, in which his passive attitude received support.

Mr. J. H. Fisher objected to the impression going out that operation on these cysts was attended with danger subsequently. He thought Mr. Cruise's case was one of retention cyst, and considered that puncture promised success.

Coloboma of Optic Nerve.

Mr. J. F. Cunningham showed a patient with coloboma of the optic nerve, which he considered was traumatic. The eye was highly myopic, and there was no perception of light. No history of injury could be gleaned, however.

Discussion.—Mr. Hepburn's view was that the case was congenital. In all the cases of the kind he had seen in which there was trauma, there was a great development of fibrous tissue, and often heaped up pigmentation, features which were absent from this case.

Mr. Mayou suggested it was probably a birth injury. He did not think there was always necessarily a mass of fibrous tissue in front of the nerve after evulsion of it: certainly if the nerve head was torn out from the scleral foramen, such a fibrous mass did not necessarily occur.

Sclerosing Keratitis.

Mr. Lindsay Rea showed a case with this condition, which came on very insidiously, without any noticeable inflammation. The Wassermann test was negative, and tuberculosis did not appear to come into the picture, but she had three very bad teeth, which he considered were the cause of the trouble, and they were being removed.

Restoration of Lower Lid After Gunshot Wound.

Mr. M. W. Oliver, who is working at the Sidcup Hospital, showed an ex-officer whose lower lid was carried away and the eye destroyed by a gunshot in the war, and who was anxious to wear an artificial eye. He described by means of slides the grafting he did, and illustrated the various stages, emphasizing the importance of lining the flap.

He was congratulated on the result by the President and Mr. Goulden, the latter remarking that in a case he did he did not line the flap, not knowing its importance, and the result was quite satisfactory notwithstanding.

Motais Operation for Congenital Ptosis.

Mr. R. Affleck Greeves showed a patient on whom he had performed a Motais operation for congenital ptosis; he intended doing the same for the other eye. He was complimented on the result by the President and Mr. Cruise, the latter referring to a similar case in which he did the operation, with excellent results. He remarked on the successful closure of the eye during sleep, despite the fact that the innervation of the muscle pulling the eye upwards was the same as for that which pulled the lid upwards, the orbicularis obviously overcoming the action of the other.

H. Dickinson.

COLORADO OPHTHALMOLOGICAL SOCIETY.

December 17, 1921.

F. E. WALLACE, presiding.

Hemorrhage Into the Vitreous. Tuberculosis of the Retinal Vessels.

J. A. MCCAW, Denver, presented a man aged forty years, a photographer by occupation, who while attending the theater on October 15, 1921, had noticed loss of vision in the right eye. When the patient was seen at Dr. McCaw's office the next day, the vision of the affected eye was 1/200. Along the branch of the central artery which passed above the macular region, were several small hemorrhages. Of these the one nearest the disc was old, the others recent. No subsequent hemorrhage occurred for about ten days, and the vision improved in the lower temporal field. Toward the end of the second week, the patient returned with practically no vision in the right eye, and examination showed a massive hemorrhage into the vitreous. The patient stated that he had taken thirty drops of adrenalin chlorid daily until two bottles had been used.

Discussion.—J. M. SHIELDS and C. E. WALKER, Denver, emphasized the necessity for absolutely thoro investigation of causation.

H. R. STILWILL, Denver, had seen a case of vitreous hemorrhage in a man of forty years, in which the result of every line of investigation was absolutely negative.

W. F. MATSON, Denver. It is not necessary to have high blood pressure to get vitreous hemorrhage. My blood pressure has never been over 125 mm. of mercury, and I have had a hemorrhage into the vitreous of the left eye.

W. C. FINNOFF, Denver. Judging by the literature this is an uncommon disease, but in reality it is not so. I have only been practicing ophthalmology about seven years, and I have seen sixteen cases, seven of them my own. It is unusual for the patient to be of the age of Dr. McCaw's case. Formerly I supported the view that cases of recurrent hemorrhage into the vitreous were likely to be tuberculous if one could not find another cause. But if the tuberculin which we use is of any value diagnostically, I have recently had three cases which I have proved not to be due to tuberculosis. In these cases, if a reaction from tuberculin is obtained, it appears in the eye in the form of perivasculitis which is characteristic of tuberculous disease of the bloodvessels. I assured two of my patients that they undoubtedly had tuberculosis of the retinal vessels, and to prove this I used tuberculin, but we ran up to five mg. of old tuberculin without any reaction whatever. On getting back from the meeting of the American Ophthalmological Society, I had another case of massive hemorrhage into the vitreous which endured a series of tuberculin tests without reaction. So Dr. McCaw's diagnosis of idiopathic hemorrhage will stand for the present. We do not know more about these cases because we never get an opportunity to study them microscopically during the active stage. In applying the tuberculin test to these cases, it is advisable to wait until the hemorrhage is completely absorbed, so that we may have a satisfactory opportunity to study the vascular changes in the fundus. Recurrent hemorrhage into the retina and vitreous in young persons is probably not a specific disease. Tuberculosis of the retinal vessels and especially of the veins is one of the etiologic factors. One thing it is important to remember. The detailed changes of retinal vascular tuberculosis are usually to be found toward the periphery of the fundus, and careful study of them requires hours rather than minutes.

Chondroma at Orbital Margin.

W. C. and W. M. BANE, Denver, presented a woman aged forty years who had come September 22, 1921, complaining of congestion near the inner canthus of the left eye, accompanied by an aching and drawing sensation in that area. The disturbance had been noticed for about four weeks. There was no loss of vision. Below the left caruncle, and elevating it and

the adjacent tissues, was a round growth which to the touch was about the size of a pea. On November 8 the growth seemed to have doubled its size. It was hard and immovable. Inspection of the left side of the nose revealed a mass springing from the cartilaginous septum, one inch from its anterior edge. The mass reached across the nasal cavity, and was inseparable from the outer nasal wall. It measured vertically about three-fourths of an inch and was covered by a smooth mucous membrane. There was a fairly good air passage above and below. A probable diagnosis of enchondroma of the nasal septum was made, and an operation was performed thru the nostril on November 14. An incision was made in the mucous membrane close to the septum, and the mucosa stripped away from the tumor, which was found to be white and quite soft. The visible mass was easily shelled out, and upon firm pressure over the growth at the inner canthus, a good deal more cartilaginous material was brought down and removed thru the nose. On subsequent exploration it was found that the middle turbinate bone, all of the anterior ethmoid cells, and the wall of the orbit posterior to the lacrimal bone had been perforated by the tumor. A probe was easily passed from the nose into the orbit. Pathologic examination by Dr. Stahl showed pure enchondroma. The results so far had been perfect.

Fig. 1.—Case of ocular pemphigus reported by W. C. Bane after 14 years.

Extreme Changes in Optic Nerve of Child; Avulsion?

W. C. and W. M. Bane, Denver, presented a boy aged ten years, whose mother gave the history that the boy's left eye had had defective vision since infancy. She could suggest no cause except possibly a fall from a buggy when the child was two years of age. The vision of the right eye was 5/5, of the left eye 5/60. The pupils were equal, but the left one reacted more slowly to light than the right. The right fundus was normal. The left fundus showed very marked changes of long duration involving the optic nerve and its immediate vicinity. The disc was elevated about three diopters. The disc margins were concealed, and the bloodvessels tortuous and atrophic, some of them being twisted like corkscrews. Covering the disc and in its immediate vicinity, there was evidently a large amount of fibrous tissue, by which some of the bloodvessels were partially covered. The vision of this eye was improved to 5/30 with correction of two diopters of astigmatism.

Discussion.—C. E. Walker, Denver. had seen two somewhat similar cases, one in a boy, and another in an older person, with regard to whom a congenital origin was assumed for the eye condition. In Dr. Bane's case the condition was probably congenital.

W. H. Crisp, Denver, suggested that the appearance of the disc could be satisfactorily explained by supposing that a partial avulsion of the optic nerve had occurred at the time of the buggy accident referred to by the mother.

Ocular Pemphigus. (See photograph.)

W. C. and W. M. Bane, Denver, presented a woman aged sixty-eight years, who had been brought before the society several times during the past fourteen years. When first shown she was suffering from pemphigus of the left eye. Contraction of the lower cul de sac of this eye had been treated by transplanting a strip of ocular conjunctiva into the sac, and later by X-ray applications, and in this eye the disease had remained in check. Seven years later, in 1914, the right eye had become affected. From time to time ulcers of the ocular and palpebral conjunctiva had developed, and these had not been benefitted by X-ray treatments. At the present time, there was a narrowing of the palpebral aperture of the right eye, and the upper and lower eyelids were strongly adherent to the eyeball. The epithelial layer of the cornea was very much thickened, rough, dry, and opaque. The cornea was insensitive. The patient suffered no pain. The vision of the right eye was good light perception and projection. The left eye had retained corrected vision of 20/20 minus 3.

Multiple Retinal Hemorrhages.

F. L. Beck for G. L. Strader, Cheyenne, Wyoming, presented a man aged twenty-eight years, who on November 21, 1921, had come complaining of a haze before the right eye which had existed for a month. The vision of this eye was 20/30—. With the ophthalmoscope several punctate retinal hemorrhages were found upward and outward from the nerve head, and one large flame shaped hemorrhage below the nerve. Some of the bloodvessels were very tortuous. There was no clinical history of lues, and a Wassermann was negative. A skiagraph of the teeth showed an apical abscess on the upper right second bicuspid, which was therefore extracted. On November 30 the hemorrhages were fairly well absorbed, and old linear scars could be seen in the retina upward and outward from the optic disc. At this examination the patient stated that he had had an attack of blurring eight or ten months previously. On December 10 the vitreous contained several large floaters and was clouded with dustlike opacities; and the vision was the same as on November 21.

Discussion.—W. C. Finnoff, Denver. Toward the periphery, to the upper nasal side of the right fundus, there are pearly white strands of retinitis proliferans, and some probable patches of retinal detachment.

Dr. Beck remarked that Dr. Strader had especially commented upon the rapid changes in this man's eye, that is the absorption, in the course of nine or ten days, of the hemorrhage below the nerve.

Penetrating Injury from Piece of Steel. Shrinking Eyeball.

F. L. Beck, for G. L. Strader, Cheyenne, Wyoming, presented a man aged thirty-eight years who on October 27, 1921, while driving one spike maul with another, had received a splinter of steel in the right eye. The fragment had produced an irregular wound about three-sixteenths of an inch long near the inner corneal margin. The lens was opaque, and the pupillary margin of the iris had the appearance of having been nicked by the foreign body in passing. By X-ray the foreign body was located in the temporal side of the globe just back of the ciliary body. On October 29, an attempt was made with a giant magnet to remove the foreign body thru the pupil. The fragment caught in the iris, and had to be removed thru a scleral incision about five or six mm. outside the corneal margin. The fragment measured two by six mm. The wound had been

covered with a conjunctival flap. The eye had run a rather stormy course for about two weeks, and for the past month had done very well except that it did not clear up. Light perception and projection were fair but were diminishing. Ten days before the date of report, the tension of the eye had been 15 mm. of mercury, and the eye had become perceptibly smaller. Should this eye be removed as a possible source of sympathetic ophthalmia?

Discussion.—C. E. WALKER, Denver: In those cases in which the lens is injured by a piece of steel entering the eye and the eye does not quiet down quickly, I believe the cataractous lens has a good deal to do with the development of iridocyclitis. This calls for early attention. Either the lens should be removed, or, where the eye refuses to quiet down and the sight is lost, enucleation should be done.

DR. BECK. The man has objected seriously to enucleation because he has light perception.

Progressive Loss of Vision. Negative Findings.

W. F. MATSON, Denver, presented a man aged twenty-one years, a stationary engineer by occupation, who from about the middle of November, 1921, had noticed progressively hazy vision, until on December 5 both eyes had become blind. He complained of a pulsating pain in each eye, with headache, nausea, and vomiting. The pupils had been dilated on December 8, and therefore yielded no information when Dr. Matson first saw the patient on December 11, but at the time of report, altho still fairly well dilated, a slight reaction to light was noticeable. Neither fundus had shown any change. Negative results were obtained thruout from X-ray examination of the teeth, nasal sinuses, and cranium, from a Wassermann test, and from a careful examination of the nervous system. On December 11 the right eye had no light perception, while the left eye had vision of the hand at twelve inches. There was no paralysis of the extrinsic muscles. The patient stated that he had been a steady drinker of "moonshine" liquor, but after he drank a certain amount of it he became nauseated and vomited.

Discussion.—F. R. SPENCER, Boulder, thought that the case looked like one of wood alcohol poisoning. The right disc seemed quite pale, and some of the vessels decidedly narrow.

W. C. FINNOFF, Denver. We must not jump to conclusions in this case. The patient's companions have been drinking the same liquor right along and are apparently unaffected. The discs do not seem to me to be white, in fact the left one appeared rather to be slightly red and the veins a little larger than normal. I should be inclined to urge opening the sphenoids and posterior ethmoids, even tho the the nasal findings are negative. There is nothing to lose by so doing.

W. A. SEDWICK, Denver, called attention to a floating body, which had been seen by several of the members, in the right vitreous at some distance below and in front of the disc; but which probably had no connection with the blindness.

Persistent Hyaloid Artery.

W. A. SEDWICK, Denver, presented a young woman whose right eye contained a blind but pulsating arterial stem projecting forward about three diopters from the optic disc, making several spiral turns, and about equal in diameter to one of the primary branches of the retinal artery. The vessel was taken to be a persistent hyaloid artery.

Glaucoma.

F. R. SPENCER and C. L. LARUE, Boulder, presented a woman aged sixty-eight years whose left eye had become completely blind and the vision of whose right eye was considerably reduced, the condition in each eye being glaucoma simplex. The trouble was thought by the patient to have started about two years previously as the result of worry following the death of her husband. The corrected vision of the right eye in September, 1920, had been 5/7.5—2; of the left eye light perception with faulty projection. At that time the tension was R. plus 2, L. slightly higher. There was a slight

nuclear opacity in each lens. The right optic disc presented a deep, possibly physiologic cup, and there was glaucomatous cupping on the left side.

Various examinations were negative except for the presence of moderate arteriosclerosis and poor general condition. In October, 1920, she had returned to her home in Iowa, where she had failed to obtain treatment other than the use of eserin, which had been begun in Boulder. At her return on December 10, 1921, the vision was R. 6/10—1, L. nil. The tension with the Schiötz-Gradle tonometer was R. 42 mm., of mercury, L. 52 mm. An operation upon the right and possibly also upon the left eye was contemplated.

Discussion.—W. C. BANE, Denver, referred to the fact that thyroid extract had been recommended in these cases, simultaneously with eserin. He had seen apparent benefit from its use in one case.

C. E. WALKER, Denver. The only treatment likely to be effective is an operation of some kind. I should favor a combination of preliminary posterior scleral puncture with an immediately following section by the Lang knife, for the purpose of obtaining a cystoid scar. This may be accompanied by an iridectomy.

W. H. CRISP, Denver, thought iridectomy the best operation for the case, and that the responsibility for doing such an operation should be promptly faced, altho in such a case there was always a risk that the vision might fail more rapidly after an operation than without it.

Brain Tumor.

E. E. MCKEOWN, Denver, presented a man aged about twenty-eight years who was probably suffering from brain tumor. For the past eight years he had had epileptic attacks. About four months previously he had been struck on the top of the head by a piece of timber. The blow did not render him unconscious. A short time later he began to have pain in the head with intermittent headaches, which had later become practically continuous. The headache was not localized, was just as bad on getting up in the morning as in the afternoon, and quite frequently awoke him during the night. A traveling optician had given him a solution of atropin, which he had used for a month. The vision of the right eye was counting fingers at four feet, of the left eye 16/50, not improved by any lens. In each eye there was a choked disc of three or four diopters, and there were small hemorrhages toward the edge of each disc, but none in the periphery of the fundus. Retinoscopic examination indicated a high hyperopia in the right eye, and emmetropia in the left. The nasal accessory sinuses had been suspected and opened, but without benefit. The Wassermann test was negative in blood and spinal fluid. A neurologist who had examined the patient felt positive that he had a tumor on the right side of the brain.

Discussion.—W. C. BANE, Denver. From the history and the appearance of the fundus, my impression is that this man has a tumor of the brain.

W. C. FINNOFF, Denver. The patient should be watched by a neurologist, and a trephining considered.

W. A. SEDWICK, Denver. Notwithstanding the negative Wassermann test, I would put the man on 606.

DR. MCKEOWN had hesitated to do this because of the possibility of arsenic affecting the optic nerve.

F. R. SPENCER, Boulder. I cannot see any object in giving 606, except to be doing something.

W. H. CRISP,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

December 19, 1921.

DR. HILLIARD WOOD, President

Enucleation of Eye and Implantation of Glass Sphere in Tenon's Capsule.

DR. HILLIARD WOOD: W. M. C., male, white, aet. 49. In 1915 cataract was present and its removal advised; op-

eration declined. Nov. 17, 1921, eye developed pain. Four days later examination showed marked vascular injection about the front of the eyeball, with irritative symptoms; hyphema filling the lower half of the anterior chamber. Upper half of pupil seen above region of the blood. Tenderness of the ciliary region. T.—48 mm. Hg. Ears, nose and sinuses negative. Faucial tonsils septic. Patient wears upper dental plate. Few remaining lower teeth suspicious. Blood pressure 130-80. A diagnosis of acute iridocyclitis with secondary glaucoma was made. Treatment: a solution of eserin and pilocarpin in the eye, and salicylat of soda internally. Tonsillectomy advised, but declined. Nov. 23—fresh hemorrhage. Anterior chamber full of blood; upper half of blood bright red, lower half dark red. Vision zero. Continued pain. Nov. 25—enucleation, and a glass sphere 20 mm. in diameter placed in Tenon's capsule. Catgut suture. After three and one-half weeks, wound has healed.

Discussion.—Dr. Fred E. Hasty pointed out that the two most important features in this technic are the choice of suture material and the danger of infection. While catgut might be used to a certain extent, it has been his custom to use silk, especially in the muscles. If infection should develop, this operation will almost certainly be a failure, as inflammatory reaction will set up, and the sphere work its way out.

Dr. J. Leslie Bryan inquired as to the advantage of glass sphere over fat implantation. Dr. Hasty's objection was that in practically all cases the fat would, in the course of time, be absorbed.

Dr. E. B. Cayce referred to a recent article by Dr. Stanford in which the writer reported fourteen cases done according to the Greenwood technic, with only one extrusion, that being a case in which catgut was used. He also referred to his personal experience in three cases of gold ball implantation, in which catgut was used, and every one of which came out. Since that time he has not attempted this technic until quite recently, when he implanted a glass sphere in Tenon's capsule. He remembers that Dr. Graddy used black silk in four cases of gold ball implantation, but personally he prefers the white silk. Black silk, however, would be an advantage in case the sutures should need removal. After all has been said and done, glass is probably more satisfactory than any other foreign substance. He referred, however, to two very successful cases of fat implantation which had come under his obesrvation, one a case presented recently by Dr. Hubbard, and one done by Dr. Graddy some twenty years ago. In the latter case the cosmetic effect is especially good.

Dr. Robert Sullivan suggested the use of silk, regardless of the color, in closing Tenon's capsule and muscles; then there is no objection to sterile catgut for making the conjunctival closure. Regarding the implantation of fat, there is no objection except that the fat does absorb within a few years. He made a plea for more effort in obtaining better cosmetic results, stating that patients are entitled to better results than they have been getting.

Bulging of Filtration Bleb Following Iridotasis.

Dr. Herschel C. Ezell presented Mrs. L. R. S. aet. 64, first consulted him January 5, 1921, giving a history of impaired vision in the left eye for many years, and sudden blindness developing in the right eye four weeks previously. Examination showed the vision of the right eye to be P. L. Left eye V.=20/200; with +0.50 D. S. ⊃+1.00 D. c. Ax. 90° V. =20/50 Cupping of each optic disc. Each anterior chamber shallow; pupils dilated; tension increased on palpation; right field could not be taken; left field contracted. Diagnosis: Glaucoma simplex. January 9th, did double iridotasis, with good result. Dec. 6, 1921, patient returned complaining of slight tenderness in left eye. Examination showed good filtration bleb in the right eye, but in left eye there was marked bulging of the filtration bleb, including

the iris tissue. The vision and field of the left eye the same as on Jan. 5th, previous to operation.

Discussion.—Dr. J. J. Frey reported that he had had a similar case in which he had simply punctured the bleb and let the fluid out, with good result.

Dr. Robert Sullivan spoke of the danger of rupture of the bleb and resulting infection, stating that in its present condition the eye would be hopelessly lost if an acute infection should develop. He suggested that a small conjunctival flap be made and pulled over the bleb to protect it.

Dr. Hasty said that in cutting off the bleb and pulling the conjunctival flap over, one should be careful to do this in such a way as to give the flap a raw surface to which to anchor; otherwise the flap will slip.

Thrombosis of Central Vein of Retina.

Dr. E. B. Cayce presented Miss E. C. aet. 40; came to his office December 5th, with the following history: Was reading yesterday afternoon and vision became suddenly dim in right eye; no pain; no other discomfort. On examination found a typical picture of thrombosis of the central vein of the retina. When first seen, retina showed white spot near center of the nerve head, with numerous hemorrhages all over fundus, especially in the lower temporal portion of field. Arteries could not be made out, and there was a slight area of swelling in the nerve head which gave the appearance of choked disc. X-ray of ethmoids and sphenoids showed negative findings. December 15th, appearance of nerve head gave the impression of a typical choked disc. Vision in eye was fingers at twelve inches. General examination showed pyelitis and albuminuria.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

December—January.

Dr. E. B. Heckel, President.

Intraocular Foreign Body.

Dr. Edward A. Weisser reported the following case of intraocular foreign body. Mr. C. B., age 31, was chipping at bearings, Oct. 7, 1921. The foreign body entered the cornea, cutting the iris at the same time, passed thru the lens, and an X-ray showed it to be located in the vitreous, 12 mm. back of the center of the cornea, 1 mm. above horizontal meridian, and 4 mm. to nasal side of vertical meridian. The magnet was applied, but no response elicited. On Oct. 29th, a peculiar looking object of some kind was noticed lying on the iris. X-ray made next day showed the foreign body 3 mm. back of center of cornea, 4 mm. above horizontal meridian and 2 mm. to nasal side of vertical meridian. The next day an opening was made in the cornea with a keratome and magnet applied without response. The foreign body had moved from the vitreous into the anterior chamber, in front of the iris. The patient now thinks foreign body is babbitt metal which is, of course, nonmagnetic. The foreign body has attached itself to the iris behind, where it is thought safe to allow it to remain, as the eye is quiet. The lens is entirely cataractous and there are broad posterior synechiae. The lens will be extracted later.

In *discussion*, the consensus of opinion was that the foreign body should be removed. Dr. Stieren thought the first radiogram faulty and that the foreign body had been hidden by exudate. Dr. Curry thought that there might be two foreign bodies in the eye. Dr. Heckel believed there was a mistake in localization. He advocated immediate removal of the foreign body. By instilling eserin to put the iris on the stretch, he thought the metal could be lifted from the iris without tearing it; if not, a small iridectomy should be done.

"Invaginating" Capsular Cataract.

Dr. Edward Stieren reported a case of what he termed "Invaginating" capsular cataract. The patient is a 50 year old man, with vision of 1/40 in the right eye and hand movements at two feet in the left eye. The left eye is much more prominent than the right and converges. This eye was injured in infancy by a cow's horn. The exterior of the right eye is normal and the pupil dilates readily and fully under homatropin. With the ophthal-

moscope and by direct illumination, the anterior capsule is completely opaque with the exception of the outer upper one-fifth of the lens. The posterior capsule is similarly affected, except to a greater extent, the opaque capsule covering practically six-sevenths of the posterior lens surface. Atropin and dionin have been used persistently for the past six months without any appreciable benefit, except that vision is slightly better, due to the enlarged pupil. The left eye has about 26 D. myopia.

Discussion.—Dr. Stieren asked the question whether the patient should be subjected to the risk of operation upon his one useful eye, which permits him to follow his occupation with present reduced vision. Drs. Heckel and Smith answered in the negative. Dr. Weisser proposed a preliminary iridectomy.

Orbital Tumor.

Dr. Edward B. Heckel exhibited a case of orbital tumor in an adult male which was being reduced by X-ray treatment. Dr. Stieren stated that from palpation of the mass he believed the tumor to have arisen from the upper inner wall of the orbit. He advised X-ray pictures for diagnosis and urged an exploratory operation inasmuch as the nature of the tumor is uncertain.

Congenital Stenosis of Nasolacrimal Duct.

Dr. J. B. McMurray reported two cases of congenital stenosis of the nasolacrimal duct, with spontaneous recovery. Both cases had only one eye involved. Condition began when patients were two and three weeks old, respectively, with epiphora, which was incessant and which turned into mucopurulent secretion following an acute inflammatory attack that subsided under antiphlogistic treatment. One of the cases was under observation for two and one-half years, and the other for three years. Operative interference for the removal of the obstruction, which was evident, was deferred until patient was old enough to have the nasolacrimal duct dilated. Treatment in the meantime was expression of the contents twice daily and the instillation of argyrol in the eye.

The parents were advised in both cases that the infants were old enough to have the operation, but before operation could be done, both ducts opened spontaneously and complete cure resulted. All evidence of lacrimal obstruction had ceased and the patients are entirely well after three years. The reason for reporting these cases is to raise the question as to how often spontaneous opening of the lacrimal ducts occur and how long one should wait for such spontaneous opening.

A third case occurred in a child one and one-half years old, with a history of having had trouble in the eye since three weeks of age. The mother was sure that nothing came from the eye at that time except tears, followed in about three months with some soreness alongside the nose. When the child was examined, there was a swelling over the lacrimal sac. Pressure expressed a large quantity of mucopurulent material. The culture contained no growth of importance. The child was treated for six months in the belief that the duct might open spontaneously. Meanwhile, the family physician reported that the child had had an acute conjunctivitis during the first weeks of its life, which he thought was mild ophthalmia neonatorum. On account of this history, immediate operation was done, with complete relief of all symptoms of obstruction.

Discussion.—Dr. E. Stieren stated that he probes under chloroform anesthesia after three or four weeks of expression, using No. 1 or No. 2 Theobald probes, with gratifying response.

Dr. Krebs probes early, under general anesthesia, syringing the duct first and using No. 3 or No. 4 Bowman's probes. He finds it necessary to probe only once.

Dr. Smith reported one case which got well spontaneously.

Drs. Jobson and Curry advocate persistent washing out of the sac with a weak solution of zinc sulphat.

Dr. Heckel expressed the secretion from the sac, but does not probe in this condition, which he prefers to call dacryocystitic blennorrhea. He limits the use of the term dacrocystitis to the acute process, which is really an abscess of the sac.

Enucleation in Infants.

Dr. Edward B. Heckel reported three cases of enucleation in infants for intraocular tumors. In infants, he does an external canthotomy to facilitate expression of the globe. He does not favor implantation operations and does not believe that it makes any difference in the development of the orbit whether or not implantation is done.

Dr. Stieren stated that he believes that it makes a difference in the development of the orbit whether or not a prosthesis is worn.

Vitreous Hemorrhage at Menstruation.

Dr. Wm. C. Meanor reported that the case of married woman, age 33, in whom hemorrhage of the vitreous occurs at every menstrual period. The hemorrhage usually begins on the second day of menstruation. The vitreous becomes so cloudy that the fundus cannot be seen, but clears up before the next period. Patient has had blurred vision during her periods ever since menstruation began.

She is the mother of two children and had the hemorrhage every month during her pregnancies. There has been no epistaxis. Blood Wassermann and other tests and examinations have been negative.

Discussion.—Dr. Van Kirk had a woman of 25 who had acute edema of the eyelids and cheeks lasting three or four days at every period. Also a woman of 35 who developed two or three blebs on the eyelid when she began to menstruate; these cleared up by cocainizing the genital area of the turbinates in the nose.

Dr. Heckel had a woman with edema of the conjunctiva and lids which occurred at irregular intervals; the condition was perhaps the result of sexual excitement.

Dr. Meanor had a case of sarcoma of the iris which had hemorrhage into the anterior chamber at every menstrual period.

Herpes Zoster Ophthalmicus With Ophthalmoplegia Totalis.

Dr. H. H. Turner reported a case in a retired mine foreman, age 77. On Nov. 14th, 1921, he contracted a "cold" with development of intense neuralgic pain over the right side of the head. Several days later he developed a well marked herpes zoster opthalmicus. He was admitted to the Mercy Hospital on Nov. 24th on Dr. G. C. Weil's service. We found, in addition to the classical skin lesion, a complete paralysis of the third, fourth and sixth cranial nerves on the right side, an ophthalmoplegia totalis. The cornea was anesthetic, but showed no tissue involvement; intraocular tension normal; the conjunctiva was hyperplastic. Senile cataract made examination of the fundus impossible.

Patient has been quite delirious at times, altho since passing the acute stage the temperature curve has not gone above 100°. The paralysis of the ocular muscles is rapidly passing, but, within the past few days, there has developed at the limbus below and extending upward into the cornea an area of deep infiltration without much inflammatory reaction or pain. The case is unusual on account of the associated ophthalmoplegia totalis.

G. H. Shuman, Secretary.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

December 13, 1921.

Injury from Bird Shot.

Dr. E. C. Ellett presented the case of S. J., aged 22, injured in the face and body, December 6, 1921.

Right eye. Wound at limbus at 4 o'clock, with large iris prolapse.

Iridodialysis down. No vision. No reflex. Tension reduced. Left eye. Small amount of blood in a. c. Conjunctiva red.

Perforation of lower lid in outer third. Fundus dimly seen, vitreous

opacities. Tension normal. X-ray, first reading showed no f. b. in R. orbit, and one at apex of L. orbit. Further study of the plates showed a shot in R. orbit, 32 mm. behind cornea. A thru and thru wound was therefore probable. Treatment. Rest in bed and atropin. The prolapse was excised O. D. and the limbal wound covered with a conjunctival flap. Stitches removed Dec. 12th. The eyes have cleared and vision is better in O.S. O.D. is still blind. For 48 hours he was unable to pass urine voluntarily.

Iridectomy for Glaucoma.

Dr. Ellett reported the case of a woman under observation for 12 years. Has had much poor health, including two strokes of paralysis, an abdominal operation and uremia. Vision was normal with glasses until April 1915, when she had an acute glaucoma O.S. Under local anesthesia and morphin, an iridectomy was done on April 17, 1915. In one month the vision was 20/20 with glasses, and now after 6 1/2 years the eye is absolutely well, with normal eyeground, vision and tension.

Discussion—Dr. W. L. Simpson said that this is a beautiful result, showing the difference between acute and chronic glaucoma.

Dr. A. C. Lewis said that it would be interesting to know the etiology in this case.

Dr. E. C. Ellett said we might think that this condition would be due to the condition of the body fluids, altho the other eye is normal. The patient had an acute uremia.

Zonular Cataract.

Dr. E. C. Ellett reported the case of Miss T., aged 29. Always had poor vision. With glasses she now sees 20/100 O.D., and 20/200 O.S. Both eyes show zonular cataracts. On Dec. 8th a free V-shaped discission was done on the left eye, and on Dec. 12th a simple linear extraction removing nearly all of the lens substance.

Discussion.—Dr. J. B. Stanford asked if there is a history of cataracts in the family.

Dr. D. H. Anthony said that this is a very good result on account of no scarring of the cornea.

Glass Ball Implanted in Tenon's Capsule.

Dr. E. C. Ellett performed this operation on H. M., aged 21, who was hurt the last of September by being struck over the left eye. When seen on November 8th, there was ciliary injection, a very deep anterior chamber, and the pupil was oval, long axis about 45°. The tension was reduced and the vitreous apparently filled with blood. The eye was enucleated on November 11th, and a glass ball implanted in Tenon's capsule. The muscles were not sutured, but a purse string suture of catgut put in the capsule, and the conjunctiva sutured separately. The ball is retained very well. The eye showed a rupture of the sclera under the external rectus muscle. There was no indication that this had occurred, but this is the usual site for a rupture of the globe from a blow.

Discussion.—Dr. J. B. Stanford said this result was as good as could be gotten by suturing the tendons. It is being done in the Mass. General Hospital. He has had one case in which he used catgut, but the sutures came loose.

Dr. Hughes asked about the size of the glass ball.

Dr. W. L. Simpson thinks that silk is better as suturing material, as he has gotten better results from using silk in fat transplants.

Dr. H. D. Anthony thinks ten days chromic catgut should be used, but that tying too tight will cause the sutures to cut thru the tissue.

S. S. Evans, Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

December 12, 1921.

Dr. E. K. Findlay, President.

Keratosis at the Limbus.

Dr. Robert Von Der Heydt: Mr. A. P. J., aged 62, farmer; left eye; first seen in March, 1921. The patient stated that the new growth had existed for six months. On inspection a triangular zone at the external limbus presented the appearance of xerosis. On examination with the corneal microscope, it

was seen to consist of a hyperemic zone surrounding a pale white flat triangular area. This latter was composed of smooth glistening round elevations. Many of these presented in their centers a deep seated whorl of blood vessels. On account of the possibility of this new growth being an epithelioma he showed it to Dr. Oliver Ormsby who without hesitation pronounced it a keratosis (leucoplakia). He stated, however, that this was the first instance where he had seen a change of this nature at this location.

On examination of the literature he found that neither Graefe-Saemisch nor Parsons had described this condition. In the new literature of the past ten years he found two exactly similar cases described, one by Boronici in the Annali di Oftalmologia, 1910, in a two-year old boy, the other by Komoto in the Klin. Monatsbl. f. Augenheilk, 1909. The latter was in a man, 33 years old. It was examined microscopically and the diagnosis of keratosis verified.

In the case shown to-night there had been but a slight increase in size in the nine months during which time he had had it under observation.

Medullated Nerve Fibers.

Dr. George F. Suker presented a case showing medullated nerve fibers in the right eye, so extensive that nine-tenths of the nerve head was involved. The massive leashes of medullated fibers extended well into the periphery of the fundus above and below. The vision was 20/40 and could not be improved with lenses. The blind spot was enlarged downward. The form and color fields were normal. The left eye was negative and vision normal.

Compensation for Ocular Injuries.

Discussion on this subject was introduced by Dr. Frank Allport who was followed by Dr. H. W. Woodruff. Dr. Nelson M. Black of Milwaukee called attention to the preliminary report of the Committee of the Section on Ophthalmology of the A. M. A., which was taken up and discussed by Drs. Black, Brawley, Blue, Brown, Gradle, Wilder, Beck, and Allport.

Dr. Von der Heydt, Cor. Sec.

SPECIAL REPORT

THREE WEEKS OF OPHTHALMIC MEDICINE AND SURGERY IN PHILADELPHIA WITH REPORT OF A CLINIC.

L. Webster Fox, M.D.

PHILADELPHIA, PA.

During three weeks of October the Quaker City has been living up to the full meaning of its name—the City of Brotherly Love. It was the Mecca for a stream of physicians and surgeons who brought with them skill and intellectuality; and we, of Philadelphia, dispensed hospitality, all of which have not been surpassed for many years. It was truly "Pleasure Valley" and physicians and surgeons were as plentiful as the "Leaves of the Valambrosa."

First, we had the State Medical Society and as the section of ophthalmology is always a very active one, many interesting papers were read and discussed.

This meeting was followed by the Academy of Ophthalmology and Oto-Laryngology. The brilliancy of this meeting was illuminated by the presence of Prof. J. van der Hoeve, of Leyden, Holland, and Prof. Fuchs, of Vienna, the Nestor of Ophthalmology.

To many members of the Academy the name of Fuchs was a legend, and to have had the double pleasure of not only seeing him, but also to have had the privilege of listening to his lectures at the College of Physicians was an event many ophthalmic surgeons hardly hoped ever to enjoy.

One of the outstanding features of this meeting was the intensive post-

graduate lectures given by distinguished teachers representing different Colleges in the United States and our two visiting surgeons from Vienna and Leyden respectively, all of who were Masters of their different subjects. This popular departure gives a prestige to the Academy which makes it the leading ophthalmic society in North America. The papers read, and the discussions following them, were of the best type, and many interesting facts were brought out in the papers. The lectures of Prof. van der Hoeve were delightful as well as educational, and we hope that we may have the honor of hearing him again in the near future.

These two meetings were followed by that of the "Clinical Congress of American College of Surgeons." We have had many fine surgical meetings in our city, but this event surpassed them all—seven hundred and twenty new members were installed in an academic atmosphere, the cap and gown being worn—this carried us back to the pre-Victorian age—"Glory to the Glorious."

The writer gave six special clinics, covering a wide range of surgical cases. The last clinic was given on Friday, October 28th, when cases rather out of the ordinary were operated upon. The writer feels that a great honor was conferred upon him by the presence of so many distinguished surgeons. If it gave the audience as much pleasure at it did the writer, the six clinic days were not spent together in vain.

CLINIC.

CASE 1. *Luxated cataractous lens* in the left eye of an adult man, presumably traumatic in origin was presented for extraction. The eye had been prepared in the usual manner and anesthetized with cocain solution. After irrigating the cul de sac with a 1 to 4000 bichlorid of mercury solution, the eye speculum was introduced and an incision was made in the cornea with a Graefe knife. As the incision progressed the lens proved to be luxated, and a bead of vitreous followed the removal of the knife as the incision was completed. The character of the vitreous bead showed that its consistency was softer than normal. The eye speculum was then gently removed and the eye covered with the upper lid. After a few moments of repose, a lid retractor was introduced to hold up the upper lid and given to an assistant to hold. A modified Smith operation followed. The broad flat curved spatula was introduced into the corneal wound immediately behind and in close contact with the posterior surface of the lens. Gentle pressure was then exercised on the lower part of the cornea by the fingers of the other hand. The lens quickly emerged without any further loss of vitreous, and there was no debris in the pupillary area. Nov. 6, the patient was discharged from the hospital with good vision.

CASE 2.—A small child, with *congenital cataract* in both eyes, in which the nucleus of each lens was opaque and the periphery clear. It was presumed that the nucleus was calcareous and would not admit of a successful needling for that reason. In consequence a *horizontal iridectomy* was performed on each eye at the nasal side to afford an artificial pupil. The value of this over the wearing of heavy lenses was stressed by the operator.

CASE 3. *Congenital cataract* in child 9-months old, in which both lenses were completely opaque was presented for the *needling* operation. This child was one of a pair of *twins*, both having congenital cataract. After the usual preparation and irrigation, the eye speculum was introduced. The globe was held by fixation, and the discission needle was introduced a trifle below the horizontal meridian of the cornea to the outer side and quickly thrust thru it into the lens. The needle was then further thrust thru the lens for its entire depth completely bisecting it in its principal diameters, thus dividing it into four sections. On the completion of this procedure the anterior portion was found floating freely in the anterior chamber. The needle was then *slowly withdrawn*, a word of caution being given as to the necessity of this procedure—it allows the anterior

chamber to empty itself so that the subsequent swelling of the fragments will not give rise to increase of tension and consequent pressure on the ciliary body with its attendant complications. The corneal wound was then seared by the application of a 5% trichloracetic acid solution applied on a cotton swab. The eye was then dressed, using a 1 grain to the dram orthoform ointment.

Case 4. *Conical cornea* in a young girl who had a preliminary iridectomy performed within a short period, was next presented. I believe that the preliminary iridectomy simplifies the technic of this operation considerably. Unfortunately in this case, immediately after the speculum was introduced the patient strained considerably and there was a small hemorrhage from the iris before the eye was touched, that necessitated postponement of the corneal operation proper. Two operations for conical cornea on different patients were performed the week previously, in the presence of Profs. Fuchs and van der Hoeve, and shown with the corneal suture in situ.

In lieu of a clinical case the surgeon demonstrated on the blackboard the technic of his operation for the relief of conical cornea, and gave the indications for the same, and briefly referred to his belief that the cone advances because of persistent increase of tension, suggesting the possibility of a form of glaucoma as an underlying cause. In view of the technic being so fully described elsewhere in the surgeon's writings it is omitted here.

Case 5. *Leucoma* of the cornea with anterior synechiæ and incarcerated iris in the right eye was next brought to the attention of the class. Owing to the clear cornea above, a broad iridectomy was performed thus making an artificial pupil of considerable dimensions.

Case 6. Chronic *trachoma* with fascicular keratitis in both eyes was presented for consideration. This was an old case and had doubtless had many forms of operative treatment with mediocre success. He was brought today for *resection of the tarsal cartilage.* The eye having been prepared and the patient etherized, the upper lid was grasped by special forceps. This resembled in part the entropion forceps. It had on the distal extremity of one blade a flat oval plate—on the extremity of the other a much shortened two pronged fork, which penetrated the lid near its margin and fixed it on the flat blade, so that it could not slip off when the lid was everted by the forceps. A slotted bar was attached to the handle so that the two blades could be automatically held together. The lid having been everted by this device, a sharp, heavy bellied knife was used to outline the margins of the cartilage, which was then dissected off with scissors. The retrotarsal fold was then pulled down over this exposed area and sutured to the margin from which the cartilage had been removed, a central suture being inserted first. This was performed on both eyes.

Case 7. The hour having expired and other surgeons having been assigned the use of the ampitheater, the rest of the clinic was held in a private operating room. The next case shown was that of a young child with *congenital nuclear cataract* in which peripheral iridectomy in the horizontal meridian had been performed. The result was very good.

Case 8. Congenital cataract in which remote needling had been performed. This appeared to be doing very well also.

Case 9. Remote *tenotomy for strabismus* after the method of von Graefe. This patient reported for observation only, and his primary trouble seemed to have been completely overcome.

Case 10. Divergent *squint* operation after a method followed for years. This consisted first in a complete tenotomy of both external recti. Then with a broad forceps the conjunctiva and subconjunctival tissue, and any redundant capsular tissue immediately within the grasp of the forceps to the nasal side of the cornea were raised and snipped off. When the forceps are released this leaves a gaping area, which is then brought together with black silk sutures anchored above and below the cornea in about the median line of the globe. This is done on one eye. The primary effect is overcorrection, or internal strabismus.

Case 11. Chronic *glaucoma in an el-*

derly man was presented for iridectomy. This was performed in both eyes using the keratome for the incision, and removing a large part of the iris well down to the base, first snipping the drawn out iris, then tearing the iris away from its base, then snipping off the separated portion.

Case 12. *Conical cornea* in a young girl, showing the result of the operation one week after its performance. With the exception of a slight amount of lymph thrown out around the sutures in the cornea, the case showed no untoward symptoms and promised a steady rapid convalescence and a good result.

Case 13. *Trachoma* in both eyes of a young man was next shown, and it was quite evident that it was a fresh case and had not received any operative treatment as yet. In view of this fact it was advised that he be prepared for the grattage operation first suggested by Darier and subsequently modified to meet local conditions.

Case 14. Remote *tarsalectomy* with *peridectomy* was then presented to show the late results following these procedures. The upper lids were both smooth on their inner surfaces and the patient was experiencing considerable comfort from his eyes since the operation.

Case 15. *Simple chronic glaucoma* in old man, showing no indications for operation was next shown. Eserin was ordered.

Case 16. *Chalazion* of considerable proportions in a colored man was next in order, but was referred to the outpatient department for operation—opening up the chalazion by vertical incision, then scooping out the contents of the sac.

Case 17. Pronounced *leucoma* of the cornea, in a patient who had one eye in good condition following some operation, consulted for advice concerning the leucoma but was advised to leave the eye alone.

Case 18. Remote *cataract* extraction in the right eye with discission of the left eye was next in order. The aphakic eye was in good condition and no interference was recommended.

Case 19. Chronic suppurative *dacryocystitis* in a woman was assigned to Dr. Coghlan of Portland, Oregon, who performed an operation he devised for the treatment of these cases. Briefly it consisted in exposing the tear sac after the manner of Meller, then incising it, and then drilling into the nose with an electrically driven drill. This is a reversal of the West method of reaching the sac from below thru the nose, and also bears some similarity to the method of Wiener of St. Louis. The patient was seen Nov. 6, and has made a good recovery. [Dr. J. Shelden Clark, of Freeport, Illinois, read a paper before the Minnesota Academy of Ophthalmology and Oto-Laryngology, at Minneapolis, January 11, 1915, on "The West Intra-Nasal Partial Resection of the Tear Sac for Dacryocystitis, Dacryostenosis, Phlegmon and Epiphora," in which he reports excellent results. The operation is very similar to that of Dr. J. N. Coghlan.]

ANNOUNCEMENT.

Washington International Congress.

The railway passenger associations of the United States and Canada offer the members of the Congress and their families *reduced rates* (a fare and a half for the round trip) under certain conditions. Upon purchasing a regular one-way ticket to Washington, a certificate should be obtained from the ticket agent. This certificate must be deposited with the Committee of Arrangements upon registering at the headquarters of the Congress, before April 27. Return tickets will be valid until May 6 inclusive. From the Pacific Coast the regular tourist rate is available.

The Presession Volume and Program will be mailed to members.

Fuchs' Lectures in Chicago.

The course of lectures by Prof. Fuchs, of Vienna, will be given in Chicago, April 10 to 20 and May 8 to 18, Mondays, Tuesdays, Wednesdays and Thursdays, from 5 to 7 P. M. Address Dr. E. V. L. Brown, 122 South Michigan Ave.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

THE HEMIOPIC PUPIL REACTION.

Ever since Wernicke in 1883 called attention to the distinction that the presence or absence of a pupil reaction to light should make between lesions of the optic tract peripheral to the corpora quadrigemina and lesions of the optic radiations or cortex, the importance of such discrimination has been appreciated by both ophthalmologists and neurologists.

The theoretic basis for it in anatomy and physiology, the reflex arc passing from visual tract to the motor tract thru Gudden's fibers in the anterior corpora quadrigemina, is perfectly clear and universally accepted. Nevertheless it is safe to say that the symptom has rarely proven of practical value, and of recent years has been regarded with skepticism as to its reliability by many clinical workers.

The difficulty seems to have been as to throwing light into the eye in such a way that it should influence the photomotor fibers from one half of the retina, and not those from the other half. To overcome this difficulty, Hess and others following his example, have endeavored by elaboration of apparatus and refinement of method to confine strictly the light falling on the retina to one lateral half of the pupillomotor area. But the results of such refinements have not added much to the practical usefulness of the test.

J. H. Fisher, departing from this line of endeavor has sought, not to confine the light to one lateral half of the retina, but to make it clearly predominant on that one half. Doing so he claims that the method gives us an absolute proof of the presence or absence of the Wernicke reaction. In his Presidential Address before the Ophthalmological Society of the United Kingdom, last year he thus describes his method. "The patient is stood at right angles to the plane of a well lighted window; the observer, facing his patient, covers the eye remote from the window with one hand. Alternately shading and unshading with the other hand the eye next to the window,

he notes the pupillary response obtained; having turned the patient thru 180° (right about turn) he repeats the same procedure, and observes whether the response of the pupil now under observation is greater or less than that of the first eye tested. The parallel rays of light impinge in each instance on the nasal half of the retina; homonymous halves are not stimulated in the two observations; any difference in the response of the two pupils indicates the presence of Wernicke's reaction. The test is perfectly simple in its application; the two pupils will react equally if the lesion causing the hemianopia is above the primary basal connections of the optic tract. In a case where the lesion involves the optic tract, the pupil on the side opposite to the lesion gives practically no response at all; the pupil of the eye on the same side as the basal lesion responds briskly; there is no uncertainty about the observation. By this simple method the Wernicke's pupillary reaction can be proved absolutely, and full value can be attached to it, whether a positive or a negative result is given."

Such a procedure and such a claim seem perfectly rational. The wonderful discriminating power of the retina is exercised, not by receiving light on some parts of the retina, while others are in darkness. Under ordinary conditions of seeing, light falls on every portion of the retina—focused light thru the pupil and diffused light thru the iris and the sclera. Yet because of relatively slight differences of stimulation of different retinal elements there arises all the different visual impressions. The light reflex of the pupil exists, apparently, to grade the general illumination of the retina so as to give a maximum of discrimination between varied stimuli that fall on different parts of the retina. It is certainly reasonable to assume that it can be elicited, by observing the behavior of the eye under conditions approaching those of ordinary seeing.

We need to be reminded now and then that laboratory conditions and laboratory results sometimes differ so widely from those of ordinary clinical observations, that it is not safe to trust them to the exclusion of more simple and common procedures, or to make them supreme in the realm of practical diagnosis. E. J.

SUCCESS IN CATARACT EXTRACTION.

There are fashions in surgery as there are fashions in clothes and note paper. They do not all come from Paris or Vienna. They emanate from every center of great surgical activity. Each has its vogue and is displaced, but each leaves some permanent impress upon the practice of the future. What has been the practice before never returns to usage exactly as it was.

One who has watched the literature and practice of cataract extraction for a generation can trace distinct cycles of change in that time. Iridectomy, that Graefe's leadership had caused to be practiced universally, fifty years ago, was largely displaced by simple extraction thru the influence of the example of Herman Knapp. But iridectomy was not wholly given up. Simple extraction has again declined in frequency, altho it still is done to a considerable extent. In this way have come the variations in procedure that seem suited to particular cases, or that appeal strongly to individual operators.

The range of such variations is large. Some operators expressed the cataract by pressure of the fingers alone, using no instrument but the knife for the operation. Others control the lids with strabismus hooks or similar devises; the majority still prefer the stop speculum or blepharostat, and to fix the globe with the ordinary fixation forceps applied at the limbus, or others that penetrate the sclera, or seize a rectus tendon, usually the superior to secure a complete certainty of preventing the ocular movements. Some habitually wash out the lens debris from the anterior chamber; others never attempt it.

It is more than likely that the operation of extraction in the capsule, by ex-

pression applied at the upper part of the cornea (Wright), or at the lower part of the cornea (Smith), or by suction either with Barraquer's erisophake, or one of the modifications of it, or the extraction by seizing the capsule with appropriate forceps, will come to occupy a similar place, as a method preferred by some; while others rarely or never attempt to remove the lens in the capsule, but continue to follow the method with capsulotomy.

Success in cataract extraction has never been achieved by following rigorously the technic of another surgeon, no matter what success he has achieved by it. Every one who desires to succeed in this most elaborated of all surgical operations should welcome and carefully study every new suggestion for modifying the technic of the operation. But he should put in practice only such procedures as he has mastered, and which seem to him most rational and effective. A good operation presupposes long and minute study of every one of its steps, and careful consideration of its dangers; perfect familiarity with every needed manipulation, a quick perception of every indication that arises while executing the operation, and wide resourcefulness for every emergency.

The important point is not the choosing the most experienced surgeon, the wisest teacher, and reproducing as closely as possible the method he practices; but the careful trial and training of one's own powers, the slow development and perfect mastery of what is really one's own method. The best operation will always be to some extent peculiar to the individual operator who practices it. Even tho it may be modified from time to time by the suggestions and example of others, it will still remain peculiar to the man who has developed it.

This operative individuality extends to all the conditions and surroundings, and to the assistants that contribute a necessary part to the success. The best showing of any operator will be made in his own clinic, with his usual assistants and conditions. The accounts of Col. Smith's operations in this country in the last number of this JOURNAL demonstrate the difficulties and dangers of operations done under unfamiliar conditions with unaccustomed assistants, no matter how good surgeons these assistants may be when doing their own operations. The great service rendered by such leaders as Col. Smith or Professor Barraquer is not that they teach a method that others must learn from them and imitate; but that they put before every serious student of their operations, new points of view and new experiences, which he can ponder and try, and which may suggest to his mind some special modification of his own procedure that will make it still more successful. E, J.

AN INTERNATIONAL CONGRESS OF OPHTHALMOLOGY.

In 1857 there was held in Brussels the first meeting that adopted the name "The International Congress of Ophthalmology." Since then, ten such gatherings have been held, nine of them in various cities of Europe, and one in 1876 in New York City. The third, which assembled in Paris in 1867, adopted a brief form of organization; which provided for the continuation of the series by establishing an international committee; but placing practically the whole power and responsibility for arranging each congress upon the local organization of the city and country in which it was held.

The twelfth congress of this kind was to have been held at St. Petersburg, Russia, in August, 1914. The breaking out of the great war prevented it from convening, and incidentally furnished some exciting experiences for Americans who had gone to Europe to attend it. The international committee charged with the continuation of this series of congresses still exists; that is some of its members still survive, altho they may never have met since the Naples Congress 13 years ago. The fate of the Russian

ophthalmologists who made most of the arrangements for the twelfth congress we do not know; and it will probably be many years before a successful international congress can be held in Petrograd. In view of this it is possible that such members of the old committee as can take any joint action might wish to adopt the Washington Congress as continuing the former series, calling it the Twelfth or Thirteenth. But we believe a more desirable outcome is possible.

Those who attend the Washington Congress, from America, will feel that the opportunity of hearing and meeting men like Collins, Elliot, Lister and their colleagues from England; Lapersonne, Morax, Magitot and other writers and teachers from France; Barraquer, Castresana, Poyales, and others from Spain, Gullstrand, Nordenson, Gallemaerts, and those from other medical centers of Europe, as well as the members from Canada, Mexico, Cuba, Argentina, Chili and Peru and other American nations, is an opportunity that ought to be available more than once in forty-five years. America with almost as many trained ophthalmologists has a right to the same advantages as Europe, of meeting to discuss the problems in which ophthalmologists are interested; and it is possible to have these advantages without robbing the old world of any of its needed opportunities.

The name chosen for the Washington Congress differs from that used for preceding congresses of the kind by a small word, with very important implications. *"The* International Congress of Ophthalmology" meant there was but one, and that was it. *"An* International Congress of Ophthalmology" means there may be many such congresses and this is one of them. It has been suggested that it might be well not to call this an "International Congress," since some nations could not be expected to take part. The name "American" or "Pan-American" has been mentioned as more appropriate. But surely a congress in which the ophthalmologists of 20 different nations join, half from the eastern and half from the western hemisphere, deserves the name "International." No other designation is so appropriate. The name "Pan-American" implies exclusion of other parts of the world, or participation only as outsiders invited for the one occasion; but this we do not want. A large part of the interest of the Washington Congress would have been lost, if the majority of papers had not been offered by writers from other countries; and those from Europe add most to its value. We want to meet these men, and meet them on the basis of full democracy in our common membership and devotion to our profession.

Surely such a Congress is "international," altho to call it "The World Congress of Ophthalmology" might have been inappropriate. The fact is no "World Congress" of ophthalmology has ever been held, nor is it likely to be in the near future. The gatherings at Naples and Lucerne, which were the largest predecessors of the one to be held this year, did not have representatives of half the nations of the earth in which scientific ophthalmologists were working and contributing to the world's literature of ophthalmology. The World Congress is still a dream of the future. Meanwhile we can have "International Congresses" worthy of the name, and the more we have of them the better. It was not mere boasting and self congratulation that some in attendance at the Vienna Congress, last August, spoke of it as "international," altho it used but one language.

It may be awkward to designate a particular gathering simply as "an" international congress. But this difficulty is easily overcome by using the name of the city in which the gathering is held. Thus we can speak of the Washington International Congress, the Buenos Aires Congress, the Montreal, or Habana, or Mexico International Congress of Ophthalmology, in designating the different gatherings which may be, and we hope will be, held in such a series. These gatherings will

not in the least interfere with similar congresses to be held in London, Paris or Vienna. The proportion of oculists in the world who can attend any one of these gatherings will be very small. It is greatly to be desired that more of us should be able to take part in them, at least two or three times in a professional life time; and the only way to make this possible is to make such gatherings more frequent, and to diffuse them more widely thruout the world.

In the United States we have three organizations that can fairly claim to have "national" annual gatherings of ophthalmologists. There are also annual meetings of organizations like the Pacific Coast Oto-Ophthalmic Society and the Colorado Congress, which have no distinct geographic limits. Among all these organizations there is overlapping of territory, but it does not interfere with the success of their meetings or their usefulness to the profession. The existence of such rival gatherings acts as a stimulus, keeps alive wide professional interest and adds to the total number of those benefited by such meetings. Two or more series of international congresses devoted to ophthalmology, drawing members from many of the same countries, would undoubtedly extend to larger numbers the benefits of such opportunities of professional contact, and seem in every way desirable. This will hold true whether these are one language congresses, like those of the Société Francaise or the Heidelberg "Ophthalmologische Gesellschaft," or are arranged on the broader basis of the Washington Congress.

E. J.

A NEW JOURNAL.

The first number of a journal called *The Eye, Ear, Nose and Throat Monthly* comes to us from Chicago. It is issued by "The Professional Press, Inc.," and in general makeup closely resembles *The Optometric Weekly* which has been published by the same company for several years.

The editor of the new monthly is Thomas G. Atkinson, M.D., whose "Oculo-Refractive Cyclopedia and Dictionary" was recently brought to the attention of our readers. The first number contains but one paper relating to ophthalmology, and that seems to have been already published in another medical journal. However, it gives abstracts of eight other articles relating to the eye, three of which appeared in this journal. The form of the monthly is attractive and it has been well edited.

E. J.

BOOK NOTICES.

Die Krankheiten des Auges im Zusammenhang mit inneren Medizin und Kinderheilkunde. Prof. Dr. Heine, Direktor der Universitäts-Augenklinik, Kiel. Large octavo, 560 pages, 219 illustrations. Berlin, Julius Springer. 1921.

This account of eye diseases in relation to internal medicine and the diseases of children, is one volume of the Encyclopedia of Clinical Medicine, edited by Langstein, von Noorden, Pirquet and Schittenhelm, of which 14 volumes have now been issued, beginning in 1914. It is one of the most complete, as it is the most up to date and best illustrated of the books that have appeared dealing with this subject.

It is divided into two parts, the first of which takes up symptomatology, the eye symptoms of general diseases. In this part are found 210 of the 219 illustrations, and a majority of them are printed in colors. They include reproduced photographs of patients, sections of tissues, and especially color sketches of the iris, the ocular fundus, and charts of the fields of vision. There are also numerous diagrams showing the relations of parts of the nerve tracts involved, actions of the ocular muscles, positions of opacities in the media, etc. A rather striking colored illustration shows the movements of light and shadow in the pupil and on the face, as seen in skiascopy in hyperopia and in myopia.

This first part deals first with the objective examination of the eye and

then with the study of subjective symptoms. In the former the headings are: the external examinations, lateral illumination, simple ophthalmoscopic illumination of the media, studies with the mirror and convex lens, the shadow test, and study of the fundus conditions as seen in the inverted ophthalmoscopic image, and a very brief account of what is revealed by the direct ophthalmoscopic examination. This last seems quite inadequate when we consider the medical importance of the slight retinal and vascular changes which the ordinary hand ophthalmoscope can only show in the erect image. It should be mentioned, however, that under lateral illumination, the corneal microscope and slit lamp examination is described, and some of the things noticed in connection with the indirect method would presuppose the higher magnifying powers of the large demonstration ophthalmoscopes. Many of the ophthalmoscopic changes are pictured as seen by both the ordinary and the redfree light. These plates, altho not of the highest order, furnish a very fair atlas of many ophthalmoscopic conditions.

The subjective investigation is opened by a brief discussion of pain, visual disturbances with objective evidences, and visual disturbances evidenced subjectively. Then it takes up in succession visual acuity, modified by refractive anomalies and accommodation; perimetry, including scotomas and the lesions producing them and hemianopsia; the color sense, light sense, binocular vision and disorders of the external ocular muscles.

The second part, rather more than half the book, is devoted to general diseases and the associated eye symptoms. It begins with toxic conditions due to substances like alcohol, nicotin, etc.; then those produced by various drugs used medicinally, poisoning due to occupations, autointoxications and poisons due to infections, as botulism. Next come the infections, beginning with tuberculosis which is accorded space (33 pages) quite in accord with what we now understand of its importance. Syphilis is accorded equal space; and then the acute exanthems are taken up.

Shorter sections are then given to the female reproductive organs, including pregnancy, then to diseases of the respiratory organs, disorders of the digestive organs, kidneys, disorders of metabolism and nutrition, diseases of the circulatory organs, of the bones, joints and muscles; diseases of the brain, spinal cord and nerves; and finally hereditary eye diseases.

The book is not free from double mention of the same topic, that amounts to repetition. Thus optic atrophy is treated at length in Part I under objective examination with the ophthalmoscope, where it is classified according to its clinical forms. Again under subjective examination many of its important symptoms are discussed. Finally in the second part of the book atrophy of the optic nerve requires mention and some discussion under the heading of each agent or disease that is liable to cause it.

This book has an extended table of contents, 15 pages. It has also, what is often lacking in books published in Continental Europe, an alphabetic subject index of 15 pages. It is on the whole an excellent reference book for the German reading ophthalmologist.

E. J.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. XLI, Session 1921, with list of the Officers, Members, etc. 590 pages, 12 plates and 91 illustrations in the text. London, J. and A. Churchill.

In practical and permanent scientific value these transactions are superior to those of any other national organization of ophthalmologists in the world. The volume represents not only the work of the Annual Congress of the Society that publish them; it includes selected papers presented to the Oxford Congress, 9; The Midland Ophthalmological Society, 8; The North of England Ophthalmological Society, 10; The Irish Ophthalmological Society, 13; and The Ophthalmological Society of Egypt, 4; besides the report of

the meeting of the Scottish Ophthalmological Club at which 22 cases were presented.

In addition to the above, which illustrate the extent of the British Ophthalmic Empire, we find here the address of the President, J. Herbert Fisher, the Bowman Lecture by E. Treacher Collins, discussions on the Psychology of Vision in Health and Disease, opened by papers by Prof. Spearman and J. H. Parsons; and on the Treatment of Manifest Concomitant Strabismus, opened by papers from Claud Worth and A. J. Ballantyne, and 29 papers, mostly clinical, read at the Annual Congress of the Society.

It should be noted that the average length of these papers is less than five pages each. We know of no ophthalmic transactions in any language that contains so much of practical interest in the same space. The present volume is the largest the Society has yet published. In form it closely resembles the others of the series that have preceded. We are glad to see in this one some of the colored plates for which these transactions have been notable in former years.

E. J.

Cataract and Its Treatment. Lt. Col. Henry Kirkpatrick, I.M.S. (retired). Published by Henry Frowde and Hodder and Stoughton, London; Oxford Press, American Branch, New York City.

This book contains 201 pages with 70 illustrations, most of which are taken from other works, with due credit. The press work is excellent, the paper and printing being very pleasing to the eye, and there are very few typographic errors. The work is divided into twenty-six chapters, with a table of contents and an index. Each chapter is followed by a list of several references.

The subject matter is largely a résumé of our knowledge of the subject, with observations drawn from the writer's experience, especially at the Madras Hospital. The author prefers the extraction with capsulotomy method to any form of intracapsular operation. Of special interest are the chapters on "Treatment after Operation," including treatment of complications, and "Modification of Operation and Technic." The reviewer cannot agree with his advice as to conjunctival disinfection preliminary to operation, as the author admits that it may result in considerable reaction. Nor can he approve of the apparently routine use of silver nitrat at the subsequent dressings, unless of course there are distinct indications for its use.

For a beginner in cataract work, and for one who desires to review the subject without wading thru a voluminous literature, the book is to be highly recommended.

C. L.

Clinical Ophthalmology for the General Practitioner. A. Maitland Ramsay, Glasgow, Scotland. London, Henry Frowde and Hodder and Stoughton.

As the result of a long and active professional life, Ramsay has brought out this new textbook, the subject matter of which has been treated in the most modern manner, from an outside view, i.e., from the standpoint of general medicine rather than as schematically described in most textbooks from that of the specialist. The author spent ten years in general practice before he specialized in eye diseases, and has ever practiced ophthalmology from that standpoint.

He has brought the treatment of diseases of the eye into line with everyday practice. He tries to teach something that hitherto, and doubtless always will be an impossibility, i.e., to make a man who is continuing with general practice able to treat his eye cases. While we concede that the family doctor should know enough ophthalmology to attend to the incidental and trivial affections and to acquaint himself sufficiently with the important conditions and changes in the eye which result from, or are incidental to general diseases; yet the field of medicine is so large that no man can master the details of the many procedures and the finer operations of this specialty. It is certainly highly inadvis-

able for the general practitioner to attempt the measurement of eyes and the prescription of glasses, for work done by such a man in such a manner and of necessity with such few instruments of precision which he is able to secure—or even if he had them—to properly use—is on a par with that of the ordinary optician; and we all know the dangers of procrastination to which such inefficient services lead.

Then, too, the entering of the general practitioner, even the general surgeon, into the finer technic of ophthalmic practice is something that should be discouraged, for the results thereby obtained are not as beneficial to their patients as those which are given by specially qualified men. Be this as it may, it is the opinion of those who are well qualified in General Medicine as well as in Ophthalmology.

To return to the book, it is one with which the oldest as well as the youngest ophthalmologist will be particularly pleased, not only with the subject matter, but with the method of handling. The reviewer has been impressed with the twenty-first century style of writing, and particularly with his therapeutics, to which a special chapter of therapeutic notes is given in seventy pages. His discussion of the workingman's compensation laws of Great Britain is apropos at this time. It is well illustrated with colored plates, those of the exterior portion of the eye being quite satisfactory, and black and white inserts. The drawing is especially good. The colors not quite true, doubtless due to difficulties in technic of reproduction—especially is the latter to be seen in his plate of fundus conditions.

On the whole the work is well worth purchasing and should meet with a good sale.

H. V. W.

Transactions of the Section on Ophthalmology of the **American Medical Association,** at the Seventy-Second Annual Session, held at Boston, Mass., June 6 to 10, 1921. Chicago, A. M. A. Press.

We find in this volume of the papers and reports read before the 1921 meeting of the Section on Ophthalmology A. M. A., a marked departure from previous years. To begin with we have three essays by authorities in other departments of medicine, on Focal Infection by Billings, The Visual Pathway and Paranasal Sinuses by Schaeffer, and Diseased Teeth as Possible Foci of Systemic Infection by Brun, which crystallize the present knowledge of the subject in relation to the eye.

Of the purely ophthalmic papers, the colloquial essay of Lt. Col. Smith, and his discussions on night blindness; the extensive study of Primary Intraneural Tumors, with its most excellent illustrations, by Verhoeff; the papers on plastic operations by Gross and Wheeler, the essay on the Blind Spot by Gradle, and the study of 1,421 senile cataract operations by Parker, are noteworthy.

Perhaps the most important contributions are the reports of committees which show most exhaustive study of the several subjects, and which have been presented in particularly readable tho condensed forms. That of the Committee on Estimating Compensation for Eye Injuries does not agree with those of the Governments of America, Great Britain, Italy or France, and may be later revised to conform with them. For instance it allows 110% for loss of an eyeball, and additional compensation for cosmetic defects. Certainly a 100% basis should be the limit. France used to have such a scale, but has given it up. That on protective glasses is short and to the point. On Local Anesthetics, despite the newer and in a measure satisfactory substitutes, the report shows that practically 98% of operators confine themselves to cocain. The committee believes that it is highly advisable to find, if possible, a synthetic anesthetic which will take the place of cocain, less toxic, less expensive, not habit forming, and equally efficient. The report on ocular muscles is highly scientific, but of practical value. The Committee on Trachoma presents an interesting and highly valuable article showing that trachoma is really not prev-

alent in America, except in a few malfavored localities. That there is a radical distinction to be made between this dangerous disease and the harmless one of folliculosis, and that the recent furor in the Southern States about trachoma in the public schools is unfounded. The report on Prevention of Hereditary Blindness makes recommendations for further study of these cases, and education of the public against marriage of those that are predisposed.

Descriptions of new instruments and a list of Fellows registering during the last five years is appended. Would it not be better to give a list of all the members whether attending or not, for only a minor portion of physicians in the A. M. A. are able to attend regularly?

H. V. W.

Pacific Coast Oto-Ophthalmic Society. Transactions of the Ninth Annual Meeting. Seattle, Washington. July 14, 15, 16, 1921.

This society embraces two hundred and seven members, taking in the men who are located west of the Rocky Mountains, and mostly on the Pacific Coast.

The papers of the last meeting were of considerable value. Those giving case histories showed evidences of full and complete study, and fully come up to modern requirements. The president, Dr. George Swift, in his address, spoke upon Hospital Standardization and the necessity of broader training with less specialism.

Of the papers presented, and herein published, that by William House, neurologist, of Portland, Oregon, on "Neuropsychiatric Views of Some Common Disorders of the Eye, Ear, Nose and Throat," showed the tendency of modern medicine, and the full discussion corroborated his findings. That by Neher on a somewhat similar subject, "A Few of the Ocular Manifestations of Hysteria and Their Relation to Compensation," was of the same character. Veasey on "Some Observations on the Extraction of Senile Cataract," gave a most succinct paper, giving his personal method, with the result of more than thirty years active study. This received considerable discussion, lead off by Lt. Col. Smith of India. Mosher, of Boston, on "Reestablishing Intranasal Drainage of the Lacrimal Sac," gave the description of this modern operation with the results of a large series of cases.

Lt. Col. Smith spoke upon early cataract. In connection with the meeting he held an operative clinic of twenty-two expressions of cataract, the subsequent results of which were all good. This was followed by E. R. Lewis, of Los Angeles, on "Remarks on the Tests of the Vestibular Apparatus." The paper of Kiehle, "Report of Case of Phlegmon of the Conjunctiva," was published in full in the January issue, 1922, of the AMERICAN JOURNAL OF OPHTHALMOLOGY. That of Keyes is a marked example of Glioma Exophytan of the eye.

An extensive report of "Industrial Insurance and Indemnity Rules of the Governments of U. S. of America, Great Britain, France, Italy, Belgium and Germany, with Notes on State Medical Aid Laws," was submitted by Würdemann, of Seattle, the ophthalmologic portion of which will be published in abstract in this JOURNAL. A number of ear, nose and throat articles were also rendered

H. V. W.

Transactions of the American Ophthalmological Society, Volume 19. Fifty-seventh Annual Meeting. Pages, 395, illustrations, 25 in text, and 22 plates, 2 in colors. Published by the Society, T. B. Holloway, Secretary.

This volume contains the papers read at the meeting of June, 1921, held at Swampscott, Mass.; and the theses of candidates accepted for membership in the Society at this meeting. These theses are by William L. Benedict, of Rochester, Minn., on "The Character of Iritis Caused by Focal Infection"; Nelson M. Black, of Milwaukee, on "Suggestions for a Uniform Method of

Estimating Loss of Visual Efficiency Following Industrial Eye Injuries; E. E. Holt, Jr., Portland, Me., "The Compensation Problem in Ophthalmology." These have not been published elsewhere. They occupy about one-sixth of the volume. Of the papers read at the meeting of the Society, some of the more important have been published in this JOURNAL. Nearly all of them are valuable contributions to the literature of practical ophthalmology.

The acme of interest in the volume is reached in the discussions that accompany some of the papers, for among the members a large proportion are leading teachers and practitioners of ophthalmology. The biographic sketches relate to three deceased members who have contributed both to the transactions of this Society and to other portions of ophthalmic literature, viz., Arthur Matthewson, of Brooklyn; George T. Stevens, of New York, of whom excellent portraits are given, and Adolf Alt, of St. Louis. Of the original members of the Society but two now remain, William H. Carmalt, of New Haven, Conn., and F. P. Sprague, of Boston, Mass. The total number of members is now 193, and of these 102 were in attendance at this meeting. The work of this organization is closely interwoven with the progress of ophthalmology in America for the last 58 years. E. J.

The Ophthalmological Society of Egypt, Bulletin of 1917. Pages 108 with 13 illustrations. Cairo, printed by M. Roditi and Co.

In the perturbations of war this publication has just reached us. Altho the title of the bulletin is published in its three "official languages," Arabic, French and English; in this number all the papers and discussions are given in English. There are notable papers by Fischer and MacCallan on the incidence of primary glaucoma in Egypt, where it is much more common than in other parts of the world, 2.08 per cent of 347,676 cases.

E. J.

South America from the Surgeon's Point of View. Franklin H. Martin, M.D., F.A.C.S. Director General of the American College of Surgeons. 12 mo., 345 pages, illustrated. Chicago, Fleming H. Revel Co.

The American College of Surgeons is preparing to extend its domain over all the western continent. Already two scouting parties have gone over the ground in South America, and this little volume is in the nature of a report on their observations with regard to medical men, and medical institutions in that continent. To those who know other countries largely thru the headlines of newspapers, it may come as a surprise that there are some of the most highly trained medical men, and some of the finest hospitals in the world in that quarter of the globe.

Of especial interest to ophthalmologists just now is a vocabulary of Spanish and Portugese equivalents of English words and phrases which occupies 38 pages. This might assist those who will attend the Washington Congress in following some of its discussions. There are also 32 pages packed with a summary of facts, historic, geographic, political, social and industrial. To one whose conceptions of the sizes of countries are founded chiefly on the maps of our school geographies, it is somewhat startling to learn that Brazil is larger than the United States.

The volume is made very attractive by the reproductions of photographs that it contains. The subjects of these are surgeons of the cities visited, officials of the various countries, views of hospitals, medical schools and public buildings, and many beautiful landscapes.

E. J.

CORRESPONDENCE.

Later Effects of Peripheral Iridotomy.

To the Editor: Since writing the article on Peripheral Iridotomy for Chronic Glaucoma, published in the December number of this journal (v. 4, p. 889), I have done 14 Curran operations on 12 eyes. I have continued to

be impressed with the remarkable immediate results of the operation, the tension almost invariably going down to normal or below, frequently from such tensions as 60 to 70 mm. Hg. (Schiötz), and staying there for a period of several months in the cases most likely to be affected favorably; i.e., in cases where there was a decided shallowing of the chamber.

In my paper, however, the results were given as provisional and the final decision as to the permanent value of the method remained to be determined. Now, a year or so after I began to do this operation, while some of the patients have retained the tension which they had shortly after the operation, two cases have returned with an increase of tension, not reaching, however, the point obtained before the operation. In one of my later cases, in which the iridotomy reduced the tension at once from 68 to 17, the tension in the course of a month has gone back to 35, while in a number of cases there has been shown a slight tendency upward; going from 10 to 20 immediately after the operation, up to 25 or 30 within the next few weeks.

In all of these cases I had tried to get along with a minimum amount of eserin (in some cases not using it at all), and on increasing the eserin to one drop of a 1/5th of 1% solution four to five times a day, the tension has receded to from 20 to 25. This convinces me that the continued use of eserin will probably be necessary in nearly all of these cases, and furthermore, it has made it necessary to still further reserve an opinion as to the final value of the operation. But even if it is necessary after the iridotomy, to keep on using eserin for the rest of the patient's life, this is a small matter if by so doing we can save the eye from a more serious operation. It may be noted that the advocates of cyclodialysis, also, have found that it is necessary to keep up the use of eserin if the favorable results of the operation are to be maintained.

One other qualification in the use of peripheral iridotomy I have obtained from a personal talk with Dr. Curran, who has reached the conclusion that where a single successful peripheral iridotomy has proved insufficient, a second one usually accomplishes nothing more permanent.

With regard to the technic, I am more than ever impressed with the fact that it is inadvisable to try to force a counterpuncture in the iris; if, after first penetrating the iris, the counterpuncture is not readily made. In such cases, it is best, after simply puncturing the iris, to cut up and a little forward against the cornea, keeping up a slow but steady pressure with a very slight sawing motion for a few seconds. Then the knife should be withdrawn very slowly, keeping up a gentle pressure for the first part of the withdrawal. By adopting this plan, I have succeeded in making a good peripheral hole in all but one of my last twenty operations, but as before indicated, the knife-needle must have a very sharp point and edge.

HAROLD GIFFORD,

Omaha, Neb.

ABSTRACTS.

Eckmann and Konings. A Case of Scabies of the Lids and Irritation of the Conjunctiva. Le Scalpel, Feb. 19, 1921. No. 8.

In this case, there was general scabby irritation of the hands, arms, legs, abdomen, thorax, back, face, scalp and eyes. The bulbar conjunctiva was a vivid red; and irregularly scattered over it, there appeared little yellowish points the size of pin heads. These were cone shaped and slightly elevated, and each one contained a parasite. The same yellowish points were present on the palpebral conjunctiva. The conjunctival cul de sacs were thickened but showed no yellow spots. Connected to all these protuberances were fine red lines. Secretion was not very abundant. The pupils were contracted and the iris hyperemic. The subjective symptom was incessant itching, more excessive at night, preventing sleep. Treatment consisted of bathing the parts with hot sublimat 1/4000 and applications of a pommade of calomel 5%. This resulted in a cure in three days. M. D.

Van Duyse, G. M. Permeability of the Cicatrix, Following Sclerectomy for Glaucoma Simplex.

Following the iridosclerectomy of Lagrange or the Elliot trephine, the cicatrix remains permeable. Hamburg's experiment upon the normal eye of a rabbit proves nothing to the contrary because, in such an eye, the natural means of excretion continue to function. In a glaucomatous eye, on the other hand, the lymphatic channels are less permeable or entirely closed.

M. D.

Gonzales, J. de J. Mycotic Tumor of Orbit. An. de la Soc. Mex. de Oft. y Oto-Rino-Lar. Febr., 1921.

When the author first saw his patient, a woman of 21, she had complained of disturbed motility of the left eye for some months. This rapidly progressed to complete paralysis. There was a swelling behind the left ear which interfered with mastication. Vision left eye was 1/10. The eye was turned out with slight exophthalmos. There was complete third nerve paralysis and paralysis of accommodation. The skin of the lids, the conjunctiva and the cornea were anesthetic and an ulcer of the cornea from exposure was present. Tuberculin tests were negative and there was no specific history. The corneal ulcer healed under local treatment after one month. The other signs, however, progressed slowly, not being influenced by mercurial treatment. An incision in the upper margin of the orbit was made and a small amount of pus escaped without, however, influencing the symptoms, whose cause remained undetermined.

After this, the patient was not seen again for four years. At this time, the eye protruded beyond the lids, vision was zero, iris was atrophic, and a cataract had developed in the left eye. There was a complete ankylosis of the jaw, and scars, apparently of broken down lymph nodes, on the neck and breast. Areas of active ulceration involved the sternum and parietal bones. Smears of pus from the region over the parietal bone showed a fungus consisting of interlaced threads with pointed terminal conidia. Under two to three drams of potassium iodid daily with iodin-potassium iodid solution applied locally to the lesions, they healed promptly and the exophthalmos decreased. In six months, there is no proptosis but a complete paralysis of the ocular muscles remains and vision is zero. The globe is apparently fixed firmly by adhesions as it cannot be moved to one side even by pressure with the fingers. Tho no cultures were made, examination of the fresh material seems to indicate that the infection was due to Sporotrichum Beurmanni. The author emphasizes the importance of being on the lookout for such rare infections, as in this case, early diagnosis would have prevented permanent lesions. (Bibliography and five illustrations.)

S. R. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville Tenn.; Dr. Gaylord C. Hall, Louisville, Ky. Volunteers are needed in other localities.

DEATHS.

Arthur C. Davis, Durango, Colorado, aged fifty-three, shot himself through the head, December 29th, while suffering from a nervous breakdown.

Dirk A. Kuyk, Richmond, Virginia, aged

fifty-seven, died December 16th, from pneumonia.

John Rankin, Brooklyn, aged seventy-six, died December 21st, from acute dilatation of the heart.

James C. Shelton, Chillicothe, Missouri, died at the local hospital from chronic nephritis, December 5th, aged fifty-nine.

The death of Dr. F. Stocker, who was in charge of the Eye Infirmary at Luzerne, Switzerland is reported.

PERSONALS.

Dr. Harry Gradle of Chicage is taking a short vacation trip to Panama.

Mrs. Emily C. Jackson, wife of Dr. Edward Jackson, of Denver, died January 28th.

John Herbert Parsons has had the honor of Knighthood bestowed upon him by King George.

Dr. Willis O. Nance left Chicago about the middle of January, for a six weeks' vacation in Southern California.

Dr. H. Alexander Brown of San Francisco is taking a trip through Japan, China and the Philippines.

Drs. Marvin M. Cullom and William G. Kennon will take up the work of Dr. Hilliard Wood who has resigned his professorship of opthalmology in the Vanderbilt University.

Drs. Magruder and Neeper of Colorado Springs, Dr. Ritchie of Trinidad, and Drs. Shields and Bane of Denver, attended the Fuchs lecture course at Houston, Texas.

Dr. V. M. Hicks, former House Surgeon of the New York Eye and Ear Infirmary, has recently joined the firm of Drs. Lewis, Battle and Wright, of Raleigh, North Carolina. Dr. Hicks' practice will be limited to diseases of the eye, and the firm will now be known as Drs. Lewis, Battle, Wright and Hicks.

In the Union College magazine for February, Dr. Alexander Duane of New York reminds his fellow alumni of the athletic record of Dr. Charles M. Culver when a college student, 1874 to 1878, which culminated in his winning the amateur championship for the 440 yard dash. Dr. Culver is better known among opthalmologists for the excellent translation he made a few years later of Landolt's "Refraction and Accommodation of the Eye."

SOCIETIES.

The annual meeting of the Indiana Academy of Opthalmology and Otolaryngology was held in Indianapolis, January eighteenth.

At the February 20th meeting of the Chicago Ophthalmological Society papers were read by Dr. Thomas Faith on "Increased Intraocular Tension," and by Dr. George F. Keiper of La Fayette, Ind., on "Comparative Anatomy of the Eye."

The January meeting of the Kansas City Eye, Ear, Nose and Throat Society was held on the nineteenth, at St. Joseph, Missouri. Those participating in the program were Drs. Beck, Forgraves, Proud and Menter. There was a dinner and a clinical program.

The Louisville Eye and Ear Society held its annual meeting and banquet at the Pendennis Club, January 12, 1922. The guest of Honor was Dr. John F. Barnhill of Indianapolis, Ind., who addressed the members on the subject of "The Fifth Nerve in its Relation to Rhinology." The twenty-five members were much indebted to Dr. Barnhill for his masterly address.

The annual meeting and banquet of the Chicago Ophthalmologic Society occurred on Jan. 16th. The subject of the after dinner program was "As Others See Us," and was discussed most interestingly from the different viewpoints, by Hon. Hugh Kearns, Dr. Matheny of Galesburg, and Dr. Wm. E. Quine. Dr. Elliott Colburn, who is one of the oldest members of the Society in active practice, told some interesting facts connected with the early history of the Society.

The following officers were elected for the ensuing year: President, Dr. Francis Lane; Vice-Pres., Dr. Frank Brawley; Sec'y, Dr. Michael Goldenberg; Councillor, Dr. A. L. Adams of Jacksonville.

During the evening a number of songs were beautifully rendered by Miss Nell Bonnell Smith of the Chicago Grand Opera Company.

MISCELLANEOUS.

The Home for the Blind, Philadelphia, will share equally with the University Hospital one-half of the income from $65,000, the residue of the estate left by Mrs. Alice M. Hirst.

The U. S. Veterans' Bureau has officially taken over the Evergreen Institute for the Blind at Baltimore, Maryland, and will conduct it as a hospital for blinded veterans of the World War.

The lecture course given by Professor Fuchs at Houston, Texas, had an attendance of almost a hundred. The course was well received and the sacrifice made by men, who were in attendance from a distance, was said by all to have been more than worth while.

A bill to regulate the practice of optometry in the District of Columbia, has been introduced in the Senate by Senator Ball. Licenses are required for all opticians, who must pass an examination. The proposed legislation is similar to the law now in existence controlling the practice of medicine.

The opthalmic section of the College of Physicians, Philadelphia, announces that arrangements are being completed for a course of lectures upon "Ocular Pathology," by Professor Ernst Fuchs. They will consist of twenty lectures, illustrated by lantern slides. The course will begin about March sixth. Further information can be obtained from Dr. G. Oram Ring, Seventeenth and Walnut Streets.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given ni English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

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PROLIFERATING CHORIO-RETINITIS OF RIGHT EYE, COVERING THE OPTIC DISK
(LAMB'S CASE)

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TRANSVERSE GUNSHOT WOUND OF BOTH ORBITS RESULTING IN A PROLIFERATING CHORIORETINITIS IN ONE EYE.

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The case here reported illustrates the ultimate result in injuries of this class. The changes found within the eye may have resulted from injury to the scleral coat, but probably not from any direct injury to the retina and choroid, except such as is produced around the track of such a missile. Read before the St. Louis Ophthalmic Society, May, 1921. (See page 296.)

The subject of our study is an exceptionally bright boy of 12 years, who, when 8 years old, in August, 1916, was accidentally shot by his brother. This occurred, according to the boy's statement, from a distance of abuot 12 inches, with a 22 rifle, while hunting. The patient had stooped to pick up a cartridge from the ground and was straightening up when the gun went off. The bullet entered about 3/4 in. anterior and 3/4 in. above the lower end of the left ear, and passing to the right upwards and forwards, came to lie behind a dislodged piece of bone at the outer end of the right eyebrow. The bullet was extracted thru an incision in the skin; there is now a small opening in the bone felt at this point. Complete blindness of both eyes immediately followed the shot, and has remained permanently.

The admission to the Missouri School for the Blind occurred in September, 1917, at which time the appearances in the fundi were essentially as they are at present.

The ophthalmoscopic examination of the left eye reveals an optic nerve of greyish white color and clear cut outline; the cribiform plate openings extend over an enlarged area, while the retinal vessels are not markedly diminished in size. Undoubtedly the nerve has been severed behind the entrance of the central vessels, causing a descending atrophy.

The ophthalmoscopic examination of the right eye shows the central part of the fundus with the optic nerve and macula covered by a prominent and extensive sheet of a rather glistening greyish white scar tissue, having a faint bluish tinge. This sheet is of very irregular outline with one long extension projecting upward; in some places the margin is continued into narrow finger like processes. No blood vessels cross this tissue, altho in two places at its edge a small, rather tortuous artery emerges from beneath it, coils over its margin for a short distance and then resumes its way to the periphery. At the margins of this plaque, there occurs a rather marked accumulation of pigment, which is retinal in appearance. Surrounding this area is a moderately broad ring of marked retinochoroidal changes, consisting of many large and small accumulations of mostly retinal pigment, interspersed with many large and small greyish white areas. Choroidal vessels are plainly seen in several places. Beyond this ring the fundus is apparently normal in appearance.

The patient states that when he was shot he was looking down and to the right. In this position the posterior .pole of each eye would be above and to the left, which would doubtless explain the injury to the maculopapillary region of the right eye. From the direction of the bullet's course, it is seen

to be quite likely that the projectile grazed or came very close to this part of the eyeball. It is not impossible that the optic nerve was forcibly drawn to the right side by the bullet or even partially avulsed. Such injuries could easily cause ruptures of the choroid and retina around the macula and optic nerve. Large amounts of resulting hemorrhage, with excessive subsequent cicatrization, covering the lacerations and filling up the excavation left by an avulsion of the nerve, would explain the ophthalmoscopic appearance of the right fundus.

Lagrange[1], in his recent Ophthalmoscopic Atlas of the War, states that all traumatic lesions of the inner membranes of the eye can be reduced to two types; lesions by concussion seated at the posterior pole and especially in the macular region, and lesions by contact produced at the spot where the missile grazes the eye. In addition lesions by concussion are choroidal ones, consisting of one or more lacerations of the choroid; whereas lesions by contact are chorioretinal ones, consisting of ruptures of the choroid and retina, which give rise to proliferating chorioretinitis.

As his 5th Law, Lagrange says that when the missile passes thru the orbit without striking the eyeball, it produces in it severe lesions by commotion, macular and paramacular disturbances. Adams[2] in his book entitled Ophthalmoscopic Diagnosis, says that in transverse shot wounds of the orbit the eyeball is pressed in from behind by the explosive force of the shot passing rapidly thru the orbit, and the choroid is thereby ruptured in many places.

Both Lagrange and Adam designate as proliferating chorioretinitis that condition which results in fundus appearances similar to those under consideration. Lagrange's explanation is that the choroid and retina are ruptured under the influence of a shock, or of ocular concussion, and a more or less extensive hemorrhagic extravasation arises in the meshes of these membranes and in the retinovitreous space. This hemorrhage is not absorbed readily; it becomes organized, irritating at the same time the connective tissues of the uveal tract at the level of the rupture. An excessive cicatrization thus results and leads to the picture of a prominent elevated greyish white mass with the retinal vessels passing over or under it. Surrounding this mass there may be a more or less extensive area, blackish and pigmented.

Lister[3] adds some particulars to chorioretinal ruptures. He states that glistening white spots are often seen ophthalmoscopically in the fundi of these cases for a short time following the injury. These gradually fade, and in the course of time their place is taken by plaques of fibrous scar tissue. It would appear likely, the author says, that these glistening white spots are patches of coagulation necrosis brought about by the rupture of retinal and choroidal vessels in the immediate neighborhood, thus cutting off the blood supply and nutrition of certain areas of the retina. The cause for the festooned outline of the cicatricial plaques, which occurs at one place with the large mass in our case, Lister says, is that the mass was larger at one time and roughly circular; it became attached at certain points to the retina where its structure was not completely disorganized, so that as contraction took place the outline became bayed between the fixed points. The same writer states that, combined and intermingled with ruptures and fibrous tissue plaques, occur areas of retinal and choroidal atrophy. Pigmentation is also commonly seen after the first few weeks; it may be either in irregular coarse patches, fine peppering or in bone corpuscle deposits.

De Schweinitz[4] has written a general review of concussion and contusion ocular injuries of the war, giving the salient points in the literature. This author says that lacerations of the choroid and retina depend in part upon stretching of these membranes by the vibrations in the vitreous. Such injuries are frequently located at the posterior pole of the eye and near the papilla, these situations being peculiarly liable,

probably because the sclera, thicker around the entrance of the optic nerve than elsewhere, does not readily stretch. Its resistance in this regard causes the effect of the force to be more potent on the tissue just in front of it.

Wagenmann[5], reviewing the literature of these cases, gives the microscopic findings in a number of eyes showing a proliferating chorioretinitis, which were enucleated and sectioned. He gives such a report by Cohn, where five months after a shot wound in the malar bone, there was found a connective tissue mass 1 to 1 1/2 cm. broad and 1 1/2 mm. thick, which extended from the papilla to the ora serrata, and into which the choroid and retina were merged. In place of the papilla, there appeared a whitish protuberance; the retina showed in the vicinity simple atrophy with pigment proliferation. Wagenmann quotes from the findings of Goldzieher in a case of transverse revolver shot wound of both orbits. Here there was found ophthalmoscopically eight months later in both eyes a large tumor like mass projecting into the vitreous. One eye, coming to enucleation on account of pain in it, showed histologically, besides pigment changes and fibrous atrophy of the retina, nodular proliferation which proceeded from the choroid, and in which some bony tissue had developed. Goldzieher considered this change the result of a plastic choroiditis.

Another case of transverse shot wound of both orbits reported by Nettleship is reviewed by Wagenmann. Thirty days after the injury, the patient died of meningitis. Microscopic examination showed in both eyes choroidal and retinal rupture with adhesion between these layers, extensive hemorrhages between the choroid and retina, as well as between the retina and vitreous, and a new formation of a connective tissue poor in cells. This connective tissue had filled the gap left by the rupture and inserted itself as a fibrillary sheet between the choroid and retina on the one hand, and between the retina and vitreous on the other.

I wish to express my indebtedness to Dr. J. W. Charles for his kindness in permitting me to report this case from his service at the Missouri School for the Blind.

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PTERYGIUM SURGERY.

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CHICAGO, ILL.

Pterygium may be either stationary or progressive. Operations for it must be especially planned to control the latter form. Its location, histology and tendency indicates pterygium is distinct from pinguecula. The operation should include thoro removal of underlying tissue with a curet, dissection including all the growth undermined to the plica and the McReynolds transplantation, modified by carrying the head suture thru the lower lid, and tying it over a bit of rubber tubing. Read before the Chicago Ophthalmological Society, Nov. 21, 1921.

When we think of the removal of a pterygium, whether it be for the cosmetic effect to be attained or for the purpose of preventing interference with good vision, we must immediately think of the type of disease we are dealing with, for upon that is dependant the surgical procedure to be resorted to.

Fig. 1.—Pterygium Operation (Goldenberg). Broken line shows outline of incision.

The classification used by the older writers, which was largely influenced by the fancied resemblance of the pterygium to other conditions and referred to by such profound names as Pterygium Crassum, Vasculosum, Carnosum, Sarcomatosum, and Membranaceum, is now obsolete; and I believe rightfully so. This is probably due to the fact that we now have a better knowledge of this condition than we possessed in years gone by, at least as to the probable prognosis, which is now very definite and good. The factor that interests us most pertinently to-day is whether the pterygium has ceased to grow or it is still in an active state;

thus the newer and simpler classification now in vogue, of stationary and progressive types.

If it is of the stationary type we have but one result to attain, and that is the cosmetic effect. If it is of the progressive type, that is one that is likely to continue growing, thus interfering with good vision, it is necessary to remove or so deviate the direction of its progress that it will overcome or correct this tendency, plus the best cosmetic effect possible, with the least trauma and shortest time for resolution.

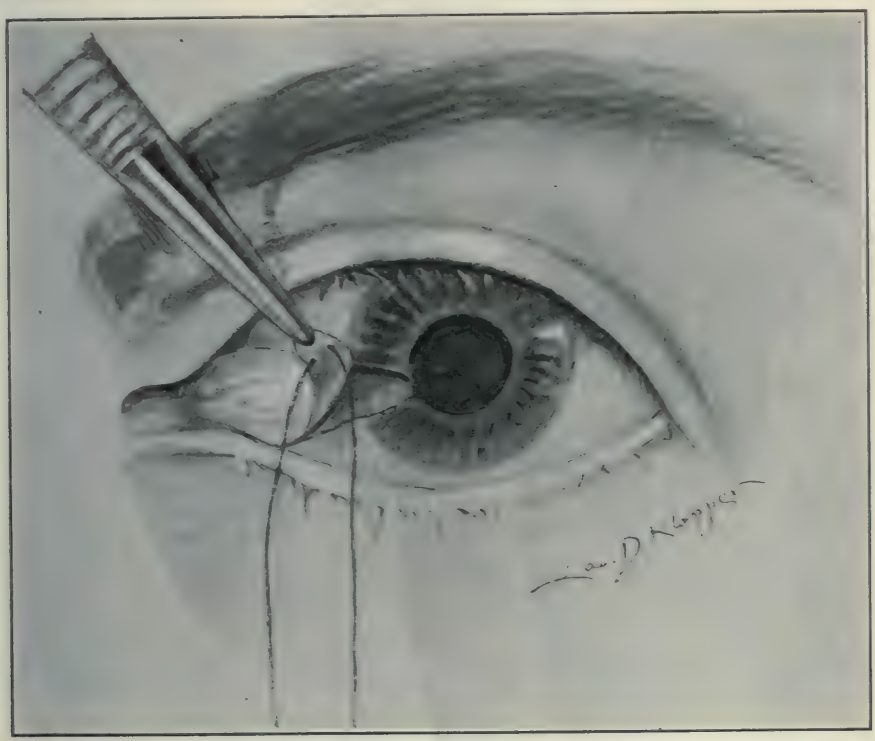

Fig. 2.—Suture passed thru head of pterygium.

It is, I am sure, not necessary at this time to go into the differential diagnosis between these two types, further than to state that it is not always possible to make a definite statement in every case. In view of this fact I think it is well to treat such doubtful cases as of the progressive type, for recurrence tho rare can and does take place.

The etiology or the theory upon which this disease is based, and the histopathology present, is of some interest to this paper; but not vital, further than to accentuate one phase of any surgical procedure that one might resort to. It has, however, another feature, and that a debatable one, which to me is rather interesting from the standpoint of etiologic theory.

We find that Fuchs seems to think that a pterygium is nothing more or less than an overgrowth of a pinguecula in the direction of the cornea, carrying with it the overlying conjunctiva. Collins and Mayou state that a pinguecula frequently precedes a pterygium, but as the ptergyium develops the pinguecula becomes flattened out and disappears. They further state that when the pterygium is very large the semilunar fold becomes decreased in size or may be entirely obliterated. In short that it is an extension of the conjunctiva upon the cornea rather than a new formation of tissue.

I should probably say an extension into the cornea, for not infrequently we find corneal epithelium covering the head of the pterygium and sometimes a destruction of Bowman's membrane and the superficial layers of the substantia propria. It would seem, according to Fuchs' description of the histopathology of a pterygium and Collins and Mayou's description of the hyalin material fused together, just under the epithelium or in the superficial layers of the sclera, with a new formation of elastic tissue which shows signs of degeneration. This would appear to me quite different from the histopathology of a pterygium as described by Fuchs, and in view of the fact that the pinguecula is triangular in shape with the base directed toward the cornea, and

Fig. 3.—Suture passed thru lower lid below the tarsus.

microscopic findings of a pinguecula, that they were somewhat opposed to each other. According to Fuchs the pterygium is identical with the conjunctiva of the eyeball. He further adds, in the tissues of the pterygium are found new formed tubular glands and also large spaces lined with epithelium from which small cysts may develop (I recently removed such a cyst), which is frequently seen in over growth of the conjunctiva in other conditions.

According to Collins and Mayou a pinguecula consists of a finely granular the pterygium an elongated triangle with its base in the opposite direction, it would seem to me a rather radical departure to say that the base of the pinguecula moves forward, while the base of the pterygium remains fixed and the apex advances. In other words the two triangles are superimpose, moving in opposite directions. It would therefore seem that the more rational deduction would be that the two conditions were distinct entities; both susceptible to probably the same irritants or conditions, and responding alike according to their own histology;

for upon the development of the pterygium the pinguecula disappears, probably due to the added protection. For are they not, both limited to the intrapalpebral spaces?

In view of these facts, which to me seem quite important, I always thoroly curette the underlying tissues, using a sharp instrument, whether it be for the removal of the stationary or progressive type, and cover the operative field with healthy conjunctiva.

I am nevertheless inclined to think that if the patient were to live as many years after any surgical procedure one might resort to for this condition as the number of years that had passed before its development, a new pterygium would again appear.

The surgical technic is very simple, without danger and positive of result. That which I have to offer is neither new or startling, probably laying a little more stress upon certain steps in the operation and offering one slight modification in the procedure for the progressive type.

Technic. In the removal of the stationary type of pterygium, after the usual preparation, I try to do as complete an extirpation as possible. First dissecting off what development may be present upon the cornea and carrying my dissection up to the plica semilunaris, I try with it to include some healthy conjunctiva above and below. I then undermine the conjunctiva above, below and to some extent around the limbus. Then using a sharp instrument I thoroly curette the exposed cornea and sclera. Then I bring the conjunctiva together with 3 or 4 interrupted silk sutures, which can be removed in 4 or 5 days.

For the removal of the progressive type, I use a slight modification of the McReynolds operation. The neck of the pterygium is grasped by a fixation forceps, thus producing slight traction upon its head, and at the same time

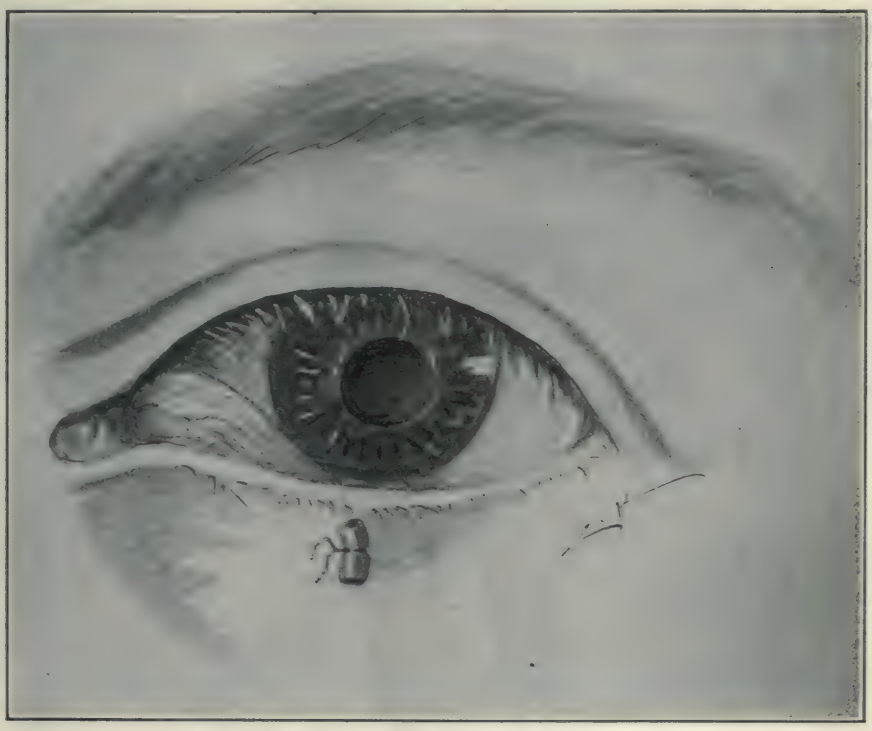

Fig. 4.—Suture tied over rubber tubing. Operation completed.

permitting a cleaner dissection. After this is accomplished as thoroly as possible, including the grayish tissue present on the cornea, with a straight blunt pointed scissors I make a 2 or 3 mm. cut in the upper part of the pterygium next to the limbus. Then the lower border of the pterygium is cut from the limbus to the semilunar fold. (Fig. 1.) Then the conjunctiva is undermined above, below and around the limbus as in the preceding type, going into both fornices.

After thoroly curetting the exposed area, a double armed silk suture is passed thru the head of the pterygium (Fig 2) and carried under the lower part of the conjunctiva or into the pouch and brought out upon the cuticular surface of the lower lid below the tarsus. (Fig. 3.) The assistant then grasps the cut edge of the conjunctiva with a forceps and exerts slight traction upward, while the surgeon produces traction upon the sutures in the opposite direction, thus carrying the head of the pterygium deep into the lower cul de sac. The sutures are then tied over a small piece of rubber tubing or gauze roll, on the outer surface of the lid. (Fig. 4.)

This slight modification of the McReynolds' operation I have performed many times in the past few years, with uniformly good results. Its only advantages are its simplicity, less reaction owing to the absence of a foreign body in the fornix, and almost impossible detection at the sight of the procedure in later years, with the exception of the scar tissue in the cornea. This latter fact is probably due to the ability to produce greater traction upon the pterygium, thus spreading the growth uniformly and retaining it taut until union has taken place.

CAPSULOMUSCULAR ADVANCEMENT WITHOUT INCISION.

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This operation should include firm scleral anchorage, whip-stitch fixation of the muscle margins with equal parallel pull, inclusion of the capsule by a double loop and a single suture removable externally. In the first stage the tendon is raised and sutures passed movable externally. In the first stage the tendon is raised and sutures passed thru thru conjunctiva and tendon from without inward. In the second stage these sutures are passed ten millimeters farther back from within outward. In the third stage each suture is carried forward near the limbus and dipped into the sclera. In the fourth stage the free suture ends are tied and the knots drawn to slightly overcorrect the squint. Two illustrative cases are reported. Read at the Philadelphia meeting of the American Academy of Ophthalmology and Oto-Laryngology, Oct., 1921.

Simplification of technic is the order of the day in all surgical procedures. It was this thought that impelled me to modify the operation that I presented before the American Ophthalmological Society in 1914, entitled "A New Operation for Capsulomuscular Advancement Combined with Partial Resection."[1] I have simply omitted the resection of the muscle and eliminated the incision thru the conjunctiva, thus making the operation one of tucking the muscle or as I prefer to call it of "crumpling," since the distribution of the wrinkles in the three superimposed tissues, muscle, capsule and conjunctiva, suggests this appearance.

It was my good fortune to see many advancement operations performed by de Wecker in the early nineties; and somewhat later to observe the work of Knapp, who greatly improved on de Wecker's technic, by employing Critchett's method of introducing the sutures. This latter operation proved most successful among the many readjustment procedures that were undertaken to restore the lost function of over corrected eyes, that were so common in those early days of radical complete tenotomies, accompanied as a rule by too free division of Tenon's capsule and the subsequent protrusion of the globe thru the capsular breach. It was on the basis of a similar principle that I planned my original operation (1) "Muscular Advancement with Partial Resection and Conjunctival Suture," which I later modified for the sake of increased efficiency under the title of (2) "Capsulomuscular Advancement with Partial Resection; a Single Stitch Method." I now desire to present this modified operation in its final form as (3) "Capsulomuscular Advancement Without Incision," which I believe will prove to be still more practical because of its greater simplicity.

The essentials of success in advancement of the extraocular muscles, from the viewpoint of my own personal experience, are (1) firm scleral anchorage, (2) whip-stitch fixation of the muscle margins, (3) equal parallel pull, (4) inclusion of the capsule by a double loop and (5) single suture removable externally. Firm anchorage must be maintained in the sclera as close to the cornea as possible. Many operators utilize the tendinous insertion of the muscle which they have just resected. This often leaves a thick, unsightly bunch at the seat of operation, which sometimes undergoes proliferation. The muscle must be firmly fixed, without causing strangulation, displacement or tearing of its fibers. "Whip-stitch" fixation of each muscle margin yields the best result of any method so far attempted and permits equal traction on each margin in order to secure a straight parallel pull. Advancement of the capsule along with the muscle always increases the effect; and where the muscle is lame and restricted in its action and thus fails to draw the eye beyond the median line, proves to be the ideal method of restoring its lost function. It is accomplished by passing a double loop thru the capsule. It is especially useful in cases requiring readjustment. A single suture will eliminate confusion and promote simplicity and efficiency. If this suture can be applied ex-

ternally it will prove more accessible for removal and further simplify the procedure. It is better, however, to have this single suture double armed.

The problem of advancement always presents some minor and collateral complications that require antecedent adjustment, in order to make the major procedure a success. If, therefore, indications should demand it, the pull of the opposing muscle should be weakened either by (a) division of capsular adhesions when present, (b) stretching of the tendon or of Tenon's capsule, (c) bilateral partial tenotomy and (d) complete tenotomy where the opposing muscle has undergone contraction. The small amount gained by those procedures is then supplemented by the advancement operation, which can be adjusted to whatever degree is necessary by measurement with the Greek Cross test object, when binocular vision is present, the surgical knot being tightened or slackened before tying, according to the indications noted. Whether much or little is gained by these preliminary and collateral measures, such conditions, if uncorrected, naturally become handicaps that prevent a good result.

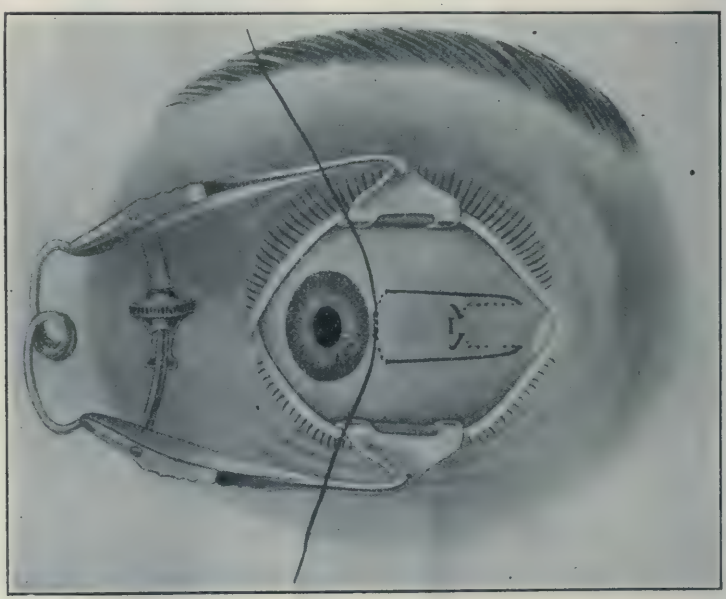

Fig. 1. Single suture entered (1) in "whip-stitch fixation" of each muscle margin, (2) carried backward under Tenon's capsule and (3) brought forward to a "scleral anchorage" near limbus.

OPERATIVE TECHNIC.

First Stage:—The muscle is grasped thru the overlying conjunctiva by fixation forceps about 15 mm. back of the sclerocorneal junction. One needle of a double armed suture is entered thru the conjunctiva and muscle at its lower third. It is then passed toward the sclera and made to emerge thru the conjunctiva at the lower margin of the muscle. The same maneuver is then repeated by entering the needle 2 mm. back of the first puncture and again emerging just back of the first exit, thus forming a "whip-stitch" on the lower margin of the muscle.

The second needle of the double armed suture is now passed, in like manner, thru the muscle at its upper third and again entered 2 mm. back of this point, thus forming a second "whip-stitch" on the upper margin of the muscle. This furnishes a central restraining thread and two lateral binders that will grip the margin tightly without slipping or tearing the muscle fibers (Fig. 1).

Second Stage:—Each needle is now separately carried backward beneath Tenon's capsule on a line parallel with each muscle margin and passed out

to the conjunctival surface about 10 mm. farther back than the "whip-"stitch (or 25 mm. from the limbus) thus forming a double "capsular loop." If desired, a small double perforated plate of celluloid or metal may be threaded onto the silk suture, to prevent it from cutting thru the tissues when forward traction is exerted to "crumple" the muscle.

Third Stage:—The lower needle is now carried forward and entered vertically thru the conjunctiva 2 mm. back of the limbus and 5 mm. below the horizontal plane, dipping firmly into the sclera and emerging 2 mm. below the horizontal plane. The same maneuver is then repeated with the upper needle and suture which should dip into the sclera 5 mm. above the horizontal plane and emerge 2 mm. above the horizontal plane, thus leaving a free, intermediate space of 4 mm. for tying the two ends of the suture. It is well to keep these two suture ends sufficiently far apart to maintain a parallel pull, and allow room for tying.

Fourth Stage:—The two free suture ends are now tied in a primary surgical knot which is steadily and firmly drawn taut until the squint is slightly overcorrected (about 5°). The effect can be measured by the Greek Cross test object and graduated as desired, if binocular vision is retained. The secondary knot is then tied.

All conjunctival rugae should be smoothed out with a silver spatula before finally tying the knot. To prevent distortion of the tissues the two lines of suture should be inserted as nearly parallel as possible and should firmly hold the conjunctiva and subjacent tissues perfectly flat against the sclera, somewhat like a mattress suture. The muscle, the capsule and the conjunctiva are thus superimposed, fixed and drawn forward to the point of anchorage (Fig. 2).

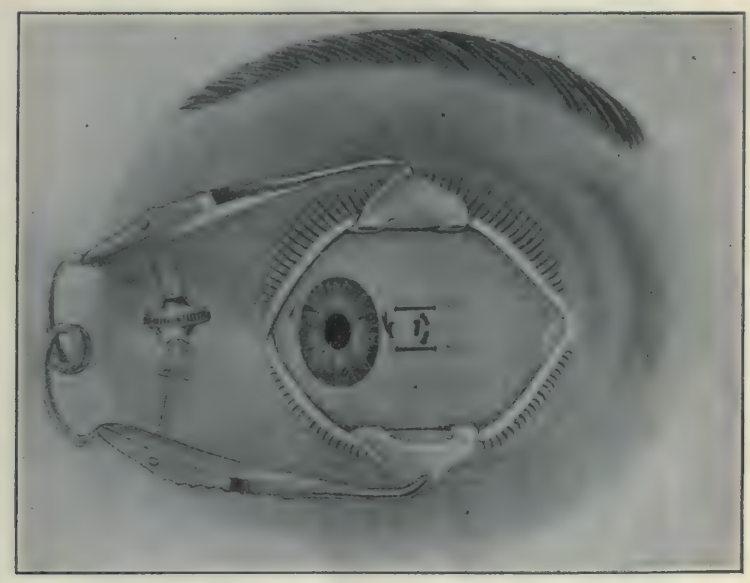

Fig. 2. Suture drawn taut and knot firmly tied. Two parallel threads, knot and whip-stitch are left exposed and easily removable. Tissues are crumpled and held flat.

To secure a permanent result, the suture should be allowed to remain in situ for at least ten days, or until firm union has occurred. If removed before this time relaxation of the muscle may take place. As the knot, "whip-stitch" and parallel lines of suture are exposed on the conjunctival surface their removal is easily accomplished. The central restraining thread of the "whip-stitch" should be cut first, while the knot is grasped with forceps and drawn out with a steady pull. No. 1

braided black silk is preferably used, boiled in equal parts of paraffin and vaselin.

The eye is kept bandaged for a few days. If there is pain, inflammation or edematous swelling, the dressing must be removed and ice pads applied continuously until relieved. The corrugations or thickening of the tissues caused by the "crumpling" will soon smooth out, but the redness often persists for a month.

Fig. 3. (Case 1.) Divergent squint, 60°, corrected. Right eye now rotates beyond median line, to the left.

REPORT OF CASES.

CASE 1.—Mrs. J. L., aged 28 years, consulted me on April 22, 1918, with vision of O.D. 20/50, J-3; O.S. 20/30 pt., J-1. There was pronounced divergent strabismus, O.D. turning out about 60°, with inability to converge beyond the median line. Patient believed the condition to be congenital.

Operation:—On May 15, 1918 both external recti were divided and traction made above and below with the tenotomy hook, but this only partially straightened the eyes and O.D. still failed to pass beyond the median line. The internal rectus of O.D. was then grasped by forceps and with a double armed single suture, a "whip-stitch" was made on each margin of the muscle to fix it. This suture was carried back to form a double loop thru capsule and conjunctiva and brought forward to the sclerocorneal junction where it was anchored securely in the sclera. A primary surgical knot was tied and traction made to pull the muscle and capsule forward, until the tissues "crumpled" and yielded an over correction of about 5°. The suture was removed on the tenth day. Convalescence was prompt and uneventful. Refraction under cycloplegia yielded:

O.D. 15/200 S + 2.D. ⊃ C + 1.D. Ax 105° 20/20 pt.

O.S. 15/200 S + 1.75D. ⊃ C + O .75D. Ax. 15° 20/20.

The result of this advancement operation has been permanent during the past three and one-half years, both as to orthophoria and as to restoration of convergence power in the right internal rectus. (Figs. 3, 4, 5).

Fig. 4. (Case 1.) Eyes rotate well to the right.

Fig. 5. (Case 1.) Eyes looking straight ahead. Orthophoria.

Case 2.—Miss A. W., aged 20 years, was first seen by me on April 20, 1920, suffering from marked convergent strabismus, O.S. turning in about 65° and slightly hypertropic. Excursion was limited to the median line. She was wearing a high correction for hyperopia and the eyes were slightly less convergent when glasses were worn.

Fig. 6. (Case 2.) Convergent squint, 65°, corrected. Left eye now rotates beyond median line, to the left.

Vision of O.D. 20/20 pt., J-2 and of O. S. 1/200. O.S. had been injured at 7 years of age by a tin can which cut the cornea and iris and probably bruised the lens. There was adherent leucoma on the nasal side, and a slight opacity of the anterior surface of the lens.

Operation.—On May 11, 1920, capsulomuscular advancement of external rectus O.S. was made by suture alone without incision, which brought the eye almost into position. This was supplemented by making a small conjunctival incision over the internus, inserting a tenotomy hook and stretching the muscle above and below, as recommended by Panas and Fox. In doing this a small capsular adhesion was found above and divided, thus permitting the eye to return to normal level. As the external movement of the globe was still somewhat limited, a partial tenotomy of the internus was performed which greatly improved excursion.

A bandage was worn for two days. The "crumpling" of the muscle was evident for one week, but there was no reaction. The redness, however, persisted for one month. The suture was removed on the twelfth day. Under cycloplegia the following error was found:

O.D. 20/200 S + 3.50D ⊃ C + .62D. Ax 105° = 20/15 pt.

O.S. 1200 S + 1.75 ⊃ C + .37D. Ax 90° =20/100.

These were ordered with a slight reduction in the right spherical.

Examination on December 8, 1920, showed that the movement of the eyes was excellent in all directions and that excursion of O.S. to left side had been fully restored. There remained an esophoria of P 5° base out. The result

of this operation has been permanent for eighteen months (Figs. 6, 7, 8).

A review of this case shows that there were three difficulties to be overcome: (1) long continued over convergence from suppression of the image in O.S., (2) contraction of the internal rectus and capsule over it, which required stretching and partial tenotomy to restore excursion beyond the median line and (3) adhesion of the capsule to the globe at the upper margin of the internal rectus causing hypertropia.

Fig. 7. (Case .) Eyes rotate well to the right.

One of the chief advantages of capsulomuscular advancement without incision is that both capsule and muscle are brought forward together, instead of being separated by the sweep of the tenotomy hook. The question has been raised as to how an unexposed and undisturbed capsule and muscle can unite in a new position on the globe without incision or scarification of the tissues invloved. It must be evident that the "crumpled" muscle and the pressure of the suture against the superimposed tissues in a new position will cause plastic exudate to be thrown out, just as in the de Wecker-Knapp capsular advancement or in any other advancement, since union always occurs on the bulbar surface and not at the cut end of the muscle. We do not scarify the surfaces in any of these methods of advancement, but depend on severance of the tissues by the tenotomy hook. Displacement of the tissues by "crumpling" will cause the same effect.

Capsulomuscular advancement has a distinct advantage in all cases where the excursion is limited, or where the muscle is paretic, or where readjustment is required. This single stitch method without incision is an improvement on my former method of partial resection, and in my practice has supplanted all other operations for muscular advancement. It possesses, therefore, all of the advantages which I claimed for the former method, with none of its disadvantages:

1. Firm scleral anchorage.

2. Whip-stitch fixation of each muscle margin.

3. Double capsular loop passed backward from insertion of whip-stitch.

4. Splintlike support of the muscle by parallel lines of suture laid across the superimposed conjunctiva, capsule and muscle, all of which are advanced together.

5. Straight traction on both muscle edges.

6. Graduated control while the suture is being tied.

7. Single suture, removable externally.

8. Tucking or "crumpling" of the muscle without an unsightly knuckle.

9. Reposition of the globe thru advancement of the capsule.

10. Globe cannot slip farther back if suture yields, as is possible in resection.

Fig. 8. (Case 2.) Eyes looking straight ahead. Slight esophoria (5°) when glasses are omitted.

ON THE PERMANENCE OF THE RESULTS OF MOTAIS' OPERATION.

H. Dickson Bruns, M.D.

NEW ORLEANS, LA.

This operation is believed to be suited for complete as well as partial ptosis, if uncomplicated. In the case here reported the results remain complete and satisfactory after twelve years.

In the *La Clinique Ophtalmologique* for October, 1921, our distinguished confrere Professor Jocqs has an interesting little paper giving an account of three cases on which he operated for ptosis, one of whom he had been able to see again after twenty years, the second after 23 years, and the third after twenty years. All had been operated on by different methods, and we know Professor Jocqs' comments upon them are both interesting and instructive. He concludes his article, however, by saying that he does not think Motais' operation is indicated in cases of complete ptosis. "Even," says he, "in incomplete ptosis we have to reckon with the danger that relaxation of the muscular tongue is possible after a certain number of years."

I have lately seen a young woman, then 16 years of age, upon whom I operated in 1909 for an absolutely uncomplicated congenital ptosis of a quite complete degree. On May 20, 1909, I did a Motais' operation under local anesthesia on the left eye. An adhesive strip was applied from the middle of the upper lid to the forehead in order to immobilize it and take off any strain on the recently grafted tongue. Over the eye a watch glass was held in position by adhesive strips after the eye had been filled with 10% argyrol solution. The cover glass was covered with plain aseptic gauze over which was thrown a gauze bandage. On the following day the cornea seemed to be hazy at the upper nasal margin. Atropin was instilled, and a 15% argyrol ointment introduced into the lower conjunctival culdesac. The watch glass was replaced and held in position by adhesive strips and a light bandage. The patient made an uneventful recovery, all dressings having been discontinued after three days.

Fig. 1. Result of Motais operation on left eye remaining after twelve years. (Bruns.)

On October 12, 1909, the muscle balance tested with a Maddox rod at 20 feet showed an esophoria of 3 degrees, and a left hyperphoria of 5 degrees.

The patient was next seen on March 6, 1920, and the following notes were made:

"Operated on for congenital ptosis, left eye, 1909. The patient is now a grown woman and is married. She complains of headache. She had influenza last year and thinks she had it again lately.

The Javal instrument shows: R. 2.00 axis 90°; L. 3.00 axis 80°. Lenses: R. +1.50 ⌒ +1.50 cyl. axis 90° =

20/20 mostly. Left +2.50 ⊂ +2.50 cyl. axis 80° = 20/21—20/40. These were ordered.

The cornea and conjunctiva are normal. She can close the left eye entirely, but when no special effort is made a palpebral opening about 1/6 of an inch wide remains, and she tells me that this is the condition when she is asleep. This was exactly the state of things immediately after the operation; and her condition is to-day just what it was when the photograph was taken on June 22nd, 1910. On December 22, 1921 vision with glasses L.E. = 20/30, some letters. Maddox rod at 20 feet, exophoria 1° esophoria degrees and no hyperphoria. All else as before.

It seems to me therefore, that we need not apprehend stretching of the musculo-tendinous tongue, or slip, after a sucessfully performed Motais' operation.

Perhaps I might be allowed to add that this operation seems to me to be indicated only in uncomplicated cases of ptosis; and that I do not think a total ptosis of this kind is a contra-indication. We must all agree with Professor Jocqs, that in complicated cases it is by no means the operation of choice.

SECOND EDITION OF THE JENNINGS SELF RECORDING TEST FOR COLOR BLINDNESS—AN ESTIMATE OF THE VALUE OF THE TEST.

J. E. Jennings, M.D.

ST. LOUIS, MO.

The changes in the test as here described were based on a series of examinations of persons with normal and subnormal color sense, and after consideration of various criticisms that have been offered regarding the test. These criticisms are discussed and objectionable colors, stone color and violet, have been eliminated. For correct results a trained examiner and a variety of tests are necessary.

The Jennings Self Recording Test for Color Blindness has now been in use for six years. It was first adopted as the standard test by the St. Louis and San Francisco R. R. Company, and later by the Missouri, Kansas and Texas System. During the World War the army, navy and aviation services of the United States Government used the test very extensively, and several hundred thousand men were examined. From this unusual and comprehensive trial, it is possible to come to a very fair estimate of its value. Every one admits its good features, i. e., its compact form, easy portability, freedom from loss or soiling of the worsteds, small size of each color patch, and speed of the test. There is a difference of opinion as to the value of the self recording feature. Some warmly favor it because a permanent self record is made of the color sense, which protects the men against an arbitrary decision of an inexperienced examiner and preserves the facts of the case for the information of the expert. Others think that there is great danger of rejecting a large number of men who have sufficiently normal color perception for all practical purposes.

This point is discussed in an excellent paper on Color Blindness by George L. Collins, Surgeon U. S. Public Health Service, and published in Public Health Bulletin No. 92, 1918. He says "of just what value is the record thus secured, however, is a matter of question. To decide this the writer decided to compare and study the results of the Jennings Test carefully and deliberately given 50 persons of known vision, refraction and ocular conditions, with the results of the Edridge-Green Lantern and Williams Lantern and the Holmgren worsted tests given the same persons . . . Results of the *examination*: of the 50 persons examined, 39 were able to pass the Edridge-Green Lantern and Williams Lantern and the Holmgren worsted test with no mistakes of any

kind, and they may, therefore, be considered as possessors of perfect color-sense. Of these 39 normal sighted persons 24—or over one-half—made some form of mistake in doing the Jennings Test. Ten of these persons, or about one-fourth, punched the hole at the skein marked A 4 on the diagram when given the green test skein. The skein corresponding to A 4 is not regarded as green, according to the Jennings Test, but the person with normal color sense detects a distinct green mixture in this worsted, and about one in four persons with normal color-sense punched it. Of these 39 persons passing the first three tests perfectly and who may be considered as of normal color-sense, fourteen—or about one-third—made mistakes in the Jennings Test when given the rose test skein. These normal sighted persons averaged 3.7 mistakes with the rose test alone, one person making as high as 10 mistakes—or what the test would class as mistakes. The skeins most often chosen by these persons as resembling the rose test skein corresponded to the spaces B3, D10, C6, D11, H15 and K3. E2 seems a perfectly admissible pale rose, but was often overlooked in the variegated field of more vivid colors before the eyes."

When we come to analyze the mistakes most frequently made by the 39 men, we find that on the green color board it was A4. This is a dark stone color with a tinge of green in it, and should not have been included in the test, because when punched it rather indicates an acute color sense than otherwise. The mistakes made in the rose test were all various shades of violet. The question naturally arises has a man a normal color sense who matches violet with rose? Yes and no. In the first instance, the normal eye looking critically at the violet, detects the slight tinge of red and matches it with rose. In the second instance it indicates a shortening of the violet end of the spectrum; but as the color sense of this type is normal for all practical purposes, matching violet with rose should not be counted as a mistake.

In the U. S. Naval Medical Bulletin, Vol. XV, No. 4, October, 1921, E. J. Grow, Captain Medical Corps, United States Navy, has an interesting paper entitled "Remarks on Color Blindness, together with some of the objections found with a few of the color perception tests now in use." He says: "One hundred persons representing 20 officers and 80 enlisted men in the United States Navy, all of whom were previously shown to be free from color defect, at least to any degree which would be disqualifying for a seafaring life, were each put thru the Jennings Test. The result showed that 31 enlisted men and 9 officers made from one to five mistakes each, and according to the test every one of these individuals would have been a case for rejection. From this it would appear that with the Jennings Test we would be in great danger of rejecting a large number of men who had sufficiently normal color perception for all practical purposes." As he does not mention the mistakes made, whether it was merely missing one or more of the test colors, or punching violet for rose, we are left in the dark as to the facts. However, to show how groundless his fears are, I will introduce here a letter from Dr. R. A. Woolsey, Chief Surgeon of the St. Louis and San Francisco Railway System:

"Following your request for information regarding the color sense of the last 500 men examined on the St. Louis and San Francisco Railway, I wish to report as follows; 500 men examined, 6 were color blind, 3 punched K6, brown for rose, but were passed, 7 punched A4 for green but were passed, 1 punched C9, fawn for green, but was passed, 8 punched violet for rose, but were passed, 26 missed one or two of the test colors, but this was not considered a mistake. Out of 494 not color blind, 475 made no mistake whatever. That we found only six color blind men out of a total of 500, is to be attributed to the fact that a very large percent of these applicants had been previously examined, either on

this road, or on some other. I would like to state further that we have examined over 25,000 applicants since discarding the Thomson stick in favor of your Self Recording Color Test, and can say that we are more than satisfied." How can we reconcile this wide difference between Governmental tests and those made in civil life:

Tests in the Public Health Service, 39 examined, 24 made mistakes.

Tests in the U. S. Navy, 100 examined, 40 made mistakes.

Tests in Railway Service, 494 examined, 19 made mistakes.

The only explanation I can give is that the medical officers adhere too rigidly to instructions and count as mistakes a failure to punch one of the test colors. In the ordinary Holmgren set there are perhaps 10 or 12 green skeins, yet if the man examined only picks up 6 or 8 no one would be foolish enough to reject him on that account.

Two other objections to the self recording test are mentioned in Dr. Grow's article. 1st "that the record blank may not be placed in the box according to instructions, thereby renering the result of this examination of little value." I have not encountered this difficulty in civil practice. It rather reflects on the capacity of the examiner than on the efficiency of the test. 2nd. "That any scheme where the test yarns are in a fixed position readily lends itself to memorization." I agree with Dr. Grow on this point; at the same time when we remember that there are sixty-four color patches on each color board, 128 in all, and that the box may be turned in any one of four positions, it would seem to be an exceedingly difficult feat to accomplish.

The objection that the worsted may fade is hardly worthy of consideration. In my experience it is the soiling of the worsteds by handling rather than fading that destroys its usefulness.

The last objection which is urged against all worsted tests is that they fail to detect those cases of color blindness resulting from a shortening of the red end of the spectrum. Now is this so, or is it merely an assertion made by some one years ago and repeated so many times in articles on color blindness, that it has come to be regarded as a fact? For a little light on this subject let us turn to Color Blindness and Color Perception, by Edridge-Green, known to all as a past master on the subject of color blindness. On page 117 he says, "I have found that an examination with colored wools gives us very accurate information as to the color perception of an individual." Page 128, "A very common mistake due to shortening of the red end of the spectrum is the confusion of pink (rose) and blue." Therefore, when a man matches a dark blue with the rose test skein, there is probably a shortening of the red end of the spectrum. Another surprising fact awaits us. The statement has been made repeatedly by writers that the value of the lantern is its ability to detect shortening of the red end of the spectrum. When we read on in Edridge-Green, we find that he *uses the spectroscope to detect shortening of the red end of the spectrum* and not the lantern. On page 137 we have the following case report: "B-a a 4 unit. Spectrum shortened at the red end. *Lantern test*: Tested at a distance of fifteen feet with the standard red and green lights, he was able to recognize these under all conditions of obstruction. He also correctly named the neutral glasses when shown alone." Page 154. "F. A. a 3 unit. Red end of spectrum was shortened one-third. *Lantern test*: He distinguished red from green easily under ordinary circumstances and when these were combined with the neutral glasses." *"He made many mistakes with the worsted test and matched blue with rose."* I do not mention the above cases to question the value of the lantern test, but only to show that a shortening of the red end of the spectrum is not as easily determined as we are led to believe.

Relative to the use of the Edridge-Green lantern, on page 731 of his article, Capt. Grow says: "It is a much more difficult test to understand than Holmgren's, and likewise presents far

greater chances for error in results. It is not a test for the novice."

If the Jennings test, or the Holmgren worsteds, do not eliminate persons with a shortening of the red end of the spectrum, how can we account for the fact that, as Dr. Grow says, the test has been standard in the Navy for 40 years, and yet no serious accident has occurred which could be attributed to defective color perception?

As mentioned before, the self recording test was largely used in the World War. In answer to an inquiry, Dr. Eugene Richards Lewis, Los Angeles, Cal., Col. Air Medical Service, very kindly sent me his experience with the test. He says: "After having had charge of the sixty-seven examining units of the Air Medical Service during their examinations of considerably more than 100,000 applicants for admission to the air service training schools—and after the additional experience as a member of the Medical Research Board U. S. Army Air Service from its inception to March, 1919, I feel that I can speak with authority concerning certain things connected with air medical work. I am convinced that the Jennings Color Test provides an adequate and practicable method of examining the color perception of these applicants with a degree of efficiency which was not promised by any other test with which I am familiar. I doubt that any other method of registering their color perception could have approached it in reliability and ease of standard applicability. There were instances in which it failed to negotiate the difficult problem of detecting prelearning of the test—the applicant securing beforehand (and practicing upon) one of the color boards. These mistakes are, however, to be placed to the credit of the individual applicant's determination to get by, rather than to the debit of the test's efficiency. There were also instances of mistaken rejection of applicants with normal color perception—in most of these, the fault lay in a too militaristically rigid adherence to the letter of instruction by the inexperienced examiner, disqualifying upon the basis of erroneously punched marginal shades of the primary colors. . . You are to be congratulated upon devising such a test and the air medical service is to be congratulated upon its availability at a time when the elements of speed and universal applicability assumed such great importance."

After considering the mistakes liable to be made by persons with a normal color sense, a second edition of the test has been issued by McAllister & Co., 132 Market street, Philadelphia. The objectionable stone color and all of the shades of violet have been removed. With these changes made I feel confident that the cause of much confusion has been eliminated. Of course, it is to be understood that failure to punch one or two of the test colors is not to be considered a mistake.

In conclusion it may be remarked that the variety and degree of color blindness is infinite. No test has ever been devised that will detect every one. If an examiner is to be the arbiter in a given case, he must be an expert thoroly trained to make a *variety* of tests. As this is hardly possible, when in doubt the record sheet should be passed upon by some central authority, who has the facts before him. It must be remembered that the Jennings Test is necessarily rigid, in that when a color patch is once punched, it cannot be recalled. For this reason the examiner should take time to explain the test and not allow the record blank to be punched until the applicant understands just what is required. Above all don't reject a man who in his agitation or ignorance happens to punch in a wrong opening. Investigate, explain and try him again with a new blank, or refer the man to the central authority.

SOME ASPECTS OF THE STATUS OF COLOR VISION.

BURTON CHANCE, M.D.

PHILADELPHIA, PA.

Certain historical points regarding color vision are mentioned. The parts of the visual apparatus concerned with perception are reviewed. The function of adaptation is discussed with the effects of illumination upon color perception. The luminosity of different parts of the spectrum is considered, with structural and chemical changes attending vision. The field of vision for colors is considered and then the evolution of color vision as traced in the lower animals, primitive races and children. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, November 17, 1921.

It has been many years since any systematic discussion of the subject of Color Vision has been offered at this Section, at least not since the memorable contributions of William Thomson and of Oliver. In the past 30 years the subject has engaged the attention of the physicist, the physiologist, the psychologist, and, but rarely, the ophthalmologist. Such a lack of attention on the part of the ophthalmologist is not to be wondered at, because observation requires a knowledge of and the experience in the use of complicated and elaborate apparatus in an adequately equipped laboratory, together with an abundance of normal subjects. Moreover, the busy ophthalmologist cannot undertake to pursue a course of research with any prospect of a leisurely devotion to it, with the certainty of bringing his investigations to a satisfactory conclusion. He therefore must remain an interested spectator of the operations of others.

You, Sir, and your committee, have deemed it a worth-while disposition of the time, to have presented to-night "Some Aspects of the Status of Color Vision," especially as there has been carried on recently in the British newspapers, medical, and other scientific Journals, as well as in the British Journal of Ophthalmology, a polemic and decidedly personally critical discussion of the enigma of color vision, occasioned by the publication of Edridge-Green's "Physiology of Vision." This book is an extremely individualistic work; it embodies Edridge-Green's personal study in the past 30 years. As might be expected, the author makes dogmatic statements on the value of the results of many of his observations and ideas. These he marshals into forces which he proceeds to align in such a way as to create a theory of his own design, without offering to the unlearned student the results of the observations of other investigators, for long generally accepted by most accredited authorities, but to many of which he is diametrically opposed.

The literature on Color Vision is enormous and is increasing in volume day by day. It speaks to most of us in an unknown tongue; the nomenclature is generated and enlarged by observer after observer as he proceeds in his daily studies. [The Editors of the AMERICAN JOURNAL OF OPHTHALMOLOGY are making every effort to analyze the year's publications in Color Vision for presentation in the issues of "Ophthalmic Literature."]

For those who would seriously undertake the study of Color Vision, I would recommend as a standard basic work, Parsons' "Introduction to the Study of Color Vision," not, however, as a compendium to take to the links to occupy any hiatus in one's thoughts between the events of the game's rounds. It is an encyclopedic work filled with references and citations with that degree of accuracy and completeness which has characterized all that that great compiler has published. From it I have drawn not a little in the preparation of this lecture. I would reserve Edridge-Green's book until after one has become well grounded in the fundamental principles of the study.

In the short time allowed to-night one can only touch on a few of the topics of vital interest in any consideration of the subject. Our subject is so vast and so many sided, that it is impossible to treat it fully within the limits of a single lecture, indeed I can hardly give as much as a general notion of the scope of this division of science; perhaps a truer and

fairer impression can be conveyed by brief descriptions of several aspects of it than by detailed accounts of one or two. I have therefore adopted this plan even at the risk of appearing somewhat sketchy.

HISTORICAL.

The subject of the Color Sense, is full of fascinating features. Next to astronomy, it has engaged the attention of philosophers from the remotest ages. Centuries ago, in 300 B.C., it attracted the attention of Theophrastus, the favorite pupil of Aristotle, whose work on "Sensuous Perception and Its Objects"; in which he made the attempt to deal with the phenomena of color sensations, is one of the few of his many philosophic treatises now extant. A number of centuries passed before the subject again came under notice, perhaps because investigators were deterred from attempting its solution by reason of the abstruseness of the problems, or because the faculty of being able to distinguish colors was regarded as one of the attributes of our existence, and therefore accepted as among the unsolvable mysteries.

However this may be, no record has been found of any further study of color vision until the appearance of Robert Boyle's observations in 1663. Then, in 1672, came the great discovery by Sir Isaac Newton, of the decomposition of white light by means of the prism into the, socalled, spectral colors. Newton's discovery, which has been held by some to be the greatest of his achievements, demonstrated that white light is rarely, if ever, homogeneous, but is composed of seven lights varying in color, which he called in order, red, orange, yellow, green, blue, indigo, and violet. Newton regarded the spectrum of sunlight to be in reality an image of the component parts of the light separated from one another, so that each may be viewed singly, and from this discovery came the spectroscope and all the enlightenments which the introduction of that optical appliance has made possible to science.

It was quite one hundred years later before any activity in the study of Color Vision became manifest, but this was concerned chiefly with the reporting of cases of defective color perception, the contemplation of which led to the promulgation of a Theory of Color Vision by Dr. Thomas Young.

I will leave further historical account of our subject until another time, when I hope to have the honor of presenting to you a brief resumé of color blindness, and state the essential points of the various theories of color vision, which theories are not a little governed in their reasonableness by the facts elicited in observation of the color blind. And, it seems to me, that some such facts concerning color vision as we are to consider to-night are necessary for a comprehension of the ideas embodied in the theories held by their advocates.

VISUAL SENSATIONS.

Our visual sensations comprise colorless and color sensations. The series of colorless sensations include every shade of grey between the deepest black and the most blinding white. Color sensations include not only the various "spectral" hues which are afforded by the analysis of daylight, but also others which are not to be thus obtained, as purple and carmine.

Ordinary sunlight, by appropriate means, can be split up into its component "rays" which differ from each other in their wave lengths. Certain of these are visible and constitute "Light," in the narrower sense, but instead of giving rise to the sensation of white light, they show, to the majority of persons, certain pure colors, in the following order, red, orange, yellow, green, blue, and violet. When white light is passed thru a glass prism, as in Sir Isaac Newton's original experiment, a spectrum is obtained: at one end is red, which has the longest and at the other violet, which has the shortest wave length; the intervening colors being produced by waves of intermediate lengths.

The limitation of the spectrum at the violet end is less precise, because the rays in the neighborhood are changed into rays of greater wave length by the media of the eye, particularly the lens and retina. This "fluorescence" causes them to produce a lavender hued sensa-

tion, which does not denote true visibility of the short wave length rays. Beyond the red end are waves of greater length, which when absorbed cause a rise in temperature. Beyond the violet end are waves of smaller wave length which are capable of causing chemical action. So striking is the physiologic phenomenon of the visibility of the intermediate series, that the heat rays are commonly spoken of as "infrared," and the actinic or chemical rays as "ultraviolet."

Pure spectral colors rarely occur in nature, therefore, much of the literature on color vision is devoted to observations with pigments, colored glasses, and so on. It is necessary, therefore, to say a few words about these complex colors. When white passes thru a red glass or transparent red fluid, certain rays are absorbed by the medium. The red rays, however, are transmitted in greatest quantity, so that the dominant color of light reaching the eye is red; but it is not pure red. Most blue substances, such as copper salts, allow the blue rays to pass, but also some of the green and violet, and a few of the red and yellow. Yellow substances allow much red and green to pass as well as yellow, but little blue and violet. The true composition of the transmitted light can be determined only with the spectroscope.

PARTS OF THE VISUAL APPARATUS AFFECTING PERCEPTION.

As might be expected all light sensation is affected by the various media and structures of the eye. It is not necessary for us to dwell long on the ordinary details concerning these structures; it is of interest, however, to know that the optical system of the eye is not achromatic. The crystalline lens normally possesses a slightly amber-yellow hue, which is inappreciable in youth, but with advancing years it becomes tinged with a yellow pigment. The effect is similar to that occasioned by the macular pigmentation. And, it is of importance to bear in mind, in estimating the visual sensations of elderly people, that the color of the lens causes an appreciable absorption of the more refrangible rays, green, blue, and violet.

The macula lutea, as its name implies, is permeated with a yellow pigment, the amount of which varies considerably in different individuals. Therefore, the influence of the macular pigmentation is of great moment, for because of it, certain spectral rays are absorbed more than others. The variations in color matches and in the estimation of complementary colors, by various normal sighted individuals, has been attributed to this cause. This variation in individuals is purely physical, and must not be confounded with allied variations which are due to physiologic abnormalities. Of these physical variations and physiologic abnormalities I will speak later on.

The part of the retina to which, for the present purpose, most attention must be directed is that comprising the rods and cones and the pigment epithelium. It has been shown conclusively by "Purkinje's Figures," which depend upon the position of shadows thrown by the retinal vessels upon the percipient layer of the retina, that the primary seat of visual impulses is in the layer of rods and cones. Here the most sharply defined image is formed by the optical system.

The rods and cones, as their names imply, are minute cylindrical and conical structures. They project vertically, or, more accurately, radially from the surface of the outer limiting membrane of the retina. Almost exactly at the posterior pole of the eye is situated a small area in which vision is most distinct. This area is impregnated with a yellow pigment, and hence is called the macula lutea or yellow spot. In the center of the yellow spot there is a conical pit, the fovea centralis caused by thinning out of the retina. In this minute area, the structures are reduced to little more than neuroepithelium and ganglion cells. Moreover the neuroepithelium in this region consists entirely of cones, which are here slender and elongated and are more rodlike than are found elsewhere. This change in the structure of the cones may be evidence of some physiologic combination of the functions of both rods and cones in this situation.

Passing peripherally in every direction from the central fovea, it is found that rods gradually make their appearance between the cones, and soon the number of rods in a given area becomes greater than that of the cones, so that at the extreme periphery of the retina only a few scattered cones are to be found.

In the researches in color perception three areas of the retina have been distinguished:

The Macula, measuring 1-3 mm.; the Fovea Centralis, measuring 0.24-0.3 mm. in diameter; and the Rod free area, measuring 1-3 mm.

Much knowledge has been gained as to the distribution of the rods and cones from the study of the retinae of lower animals, altho the great variety in forms of the neuroepithelial cells, in the several classes studied, prevents any generalized classification. In the retinae of most mammals, amphibia and fishes, there are rods and cones, the number of rods much exceeding that of the cones. In birds, on the other hand, cones are much in excess of rods. In most reptiles, lizards, snakes, tortoises, only cones are found. There are vertebrates possessing only rods, certain fishes, rays and dog-fish; certain mammals, hedgehog, bat, mole and night apes. There are also animals of nocturnal habits possessing only rods. Owls and mice have only a few rudimentary cones; rats also possess a few cones.

Hess has found rods in fowls and pigeons, tho there are a few in the posterior and superior parts of the retina which are most used in pecking. He found a fairly uniformly distributed, "not inconsiderable number" of yellow or brown oil globules in the retina of the owl and hawk, but these are present only in cones. As regards nocturnal birds, contradictory statements have been made by various authorities.

Colored oil globules are found in the cones of birds and reptiles; similar colorless bodies are found in fishes and amphibia. The globules are more deeply colored, yellow or brown, in night birds and in tortoises than in day birds. They are absent in the crocodile.

ADAPTATION.

Vision is profoundly affected by the condition of the retina at the moment of stimulation and by the nature of the stimulation to which the retina has been previously submitted.

When we pass suddenly from bright sunlight into a dimly lighted room, we can see nothing for a time until we become "accustomed to the darkness." When we pass from the dark into bright light, vision is also difficult and may be painful. We therefore infer that the sensibility of the retina becomes increased at low illuminations. This automatic process of leveling the sensibility of the retina to the requirements of the moment is called dark, or light, "adaptation."

Parsons speaks of the light adapted eye as a "photopic eye," and of vision under these circumstances as "photopia"; and of the dark adapted eye as a "scotopic eye" and of vision under these circumstances as "scotopia."

Dark adaptation, and its converse process, light adaptation, essentially depend on changes in the retinal apparatus. Light adaptation takes place with great rapidity, while dark adaptation can be shown to be still incomplete, even after an hour's stay in a perfectly dark room. But not the whole of the retinal surface of our eye is susceptible to dark adaptation. At the fovea dark adaptation is impossible.

Dark adaptation is a relatively slow process. It is characterized by a rise in the sensitiveness of the retina to light, which is slow during the first ten minutes of exclusion of light from the eyes, rapid during the following twenty or thirty minutes, and again slow or almost negligible after that period. The general character of the curve of retinal sensibility is the same in all cases, but there are marked individual variations in the rapidity and amount of rise, thus explaining the fact that some people see very much better in

a dull light than others, tho variations in the size of the pupils and other factors are not without importance in this respect. Mydriatics have an indirect effect; the first slow rise is prolonged from ten to twenty minutes but is followed by the normal rapid rise to the normal height. Certain drugs, as strychnin, cause increase in the amount and rapidity of the rise of sensibility. In nightblind people there may be only a very slow rise, the ultimate sensibility after an hour being near the normal limit. In severe cases there is very little rise even after several hours. Such adaptation is normal in the color blind, even in the totally color blind.

Very short exposure to bright light, e. g., striking a match, causes a very temporary fall without materially altering the course of the curve. The increase in sensibility after very prolonged dark adaptation is more quickly and completely abolished by exposure to light. Dark adaptation of one eye has no effect upon the other.

Under ordinary conditions, yellow is the brightest color sensation given by any simple color stimulus, but when the eye is adapted to sunlight, the point of maximal brightness changes from yellow to green. At the same time blue colors appear lighter and red colors darker than when seen under ordinary illumination. Indeed, so dark does the red end of the spectrum become that its extremity is invisible; the red end of the spectrum then appears shortened. Hence with failing light the brightness of different colored objects alters, the colors towards the red end of the spectrum becoming relatively darker, those towards the violet end brighter, so that finally the reds appear almost black and the blues bright. This fact was first investigated by Purkinje in 1825, and since then the changes in the relative brightness of colors are known as the "Purkinje phenomena" after the name of their discoverer. "Dark adaptation" is the essential factor for the production of the Purkinje phenomenon. The phenomenon can be readily observed at dusk on a summer's evening in a garden of variously colored flowers. They are not due merely to a reduction in the illumination of the colors, but to the adaptation of the eye to twilight. Abney, graphically, yet with great charm, described the phenomenon in his Tyndall Lecture on "Color Vision" before the Royal Institution in 1894:

"At nightfall in the summer the order of disappearance of color may often be seen; orange flowers may be plainly visible, yet a red geranium may appear black as night; the green grass will be grey when the color of the yellow flowers may yet be just visible. An early morning start in the autumn before daybreak will give an ample opportunity of satisfying oneself as to the order in which colors gradually reappear as daybreak approaches. Red flowers will be at the onset black, whilst other colors will be visible as grey. As more light comes from the sky the pale yellow and blue flowers will next be distinguished, tho the grass may still be a nondescript grey. Then, as the light still increases, every color will burst out, if not in their full brilliance yet into their own undoubted hue."

Besides this temporal variation in the sensitiveness of the retina, there is a well marked regional variation. The light sensitiveness of the various parts of the retina must be carefully distinguished from their visual acuity for form. In the condition of light adaptation, the fovea is the most sensitive part of the retina; in dark adaptation the fovea is the least sensitive part of the retina. In other words the fovea is a region of physiologic nightblindness.

The absence of Purkinje's phenomenon at the fovea, when taken in conjunction with the absence of rods at the fovea, suggests that while the cones are concerned with ordinary vision under conditions of bright adaptation, it is the function of the rods to develop colorless sensations in the dark adapted eye. On this supposition the rods become the end organs of colorless vision for dim light.

If a number of patches, colored or colorless, be viewed in a nearly dark room by the sufficiently dark adapted

eye, it will be found that the particular patch to which the eye is turned is invisible, while the others are visible. As soon as the eye is turned to regard any one patch, that patch immediately vanishes. Now the fovea is the region of the retina which ordinarily receives light from a not too large object when the eye is turned to fixate it. Various other pieces of experimental evidence confirm the conclusion that, at the fovea, dark adaptation, the Purkinje Phenomenon and even vision under conditions of low illumination, are absent. So also is the excitability of a given area affected by the condition of sensibility and stimulation of the surrounding areas.

The relative central scotoma in dark adaptation was long ago recognized by astronomers, who noticed that stars of small magnitude were seen better if viewed somewhat eccentrically. They found on viewing the Pleiades, that by direct fixation four or at most five stars were seen, but by indirect fixation a number of weaker stars became visible. The direction is constant for the same eye and varies with different eyes; it depends upon macular balance and refraction rather than upon the specific sensibility of the parts of the parafoveal region.

Altho the fovea is nightblind relatively to the periphery, it is capable of a slight degree of dark adaptation.

Complete dark adaptation is only reached after prolonged exclusion of light. Hence a moderate degree of scotopia is generally present in everyday life, sufficient indeed to elicit the Purkinje Phenomenon merely by sudden diminution of the intensity of the stimulus. If after remaining for a considerable time in a moderately lighted room, the illumination is suddenly diminished, reds at once appear much darker and blues much brighter.

It will be readily appreciated that complete dark adaptation rarely occurs under normal conditions of life. Scotopia is the condition of vision in which there is a relatively high degree of dark adaptation. It will be best to consider the conditions of vision after prolonged stay in a feebly lighted room. If colored objects are viewed under feeble illumination, the colors cannot be distinguished, but all appear to be of various shades of grey. The eye is totally color blind. A spectrum of low intensity appears as a colorless bright streak, varying, however, in brightness in different parts. Consequently accurate matches can be made between any two parts of the spectrum by merely modifying the intensity of one light.

If the intensity of the spectrum is slightly raised the colors become evident in a definite order and the relative brightness of the different parts becomes altered. As the intensity is still further raised, the eye becomes light adapted and the spectrum shows all its hues with the manifestation of relative brightness. Scotopic vision at very low intensities is therefore achromatic; with slightly raised intensities of light it becomes chromatic. We may distinguish the two conditions as achromatic and chromatic scotopia respectively.

LUMINOSITY OF THE SPECTRUM.

In his celebrated book on, "Optics," published by Sir Isaac Newton, in 1704, appears this passage: "It is to be noted that the most luminous of the prismatic colors are the yellow and orange. These affect the senses more strongly than all the rest together; and next to these in strength are red and green. The blue compared to these is a faint and dark color, and the indigo and violet are much darker and fainter, so that these compared with the stronger colors are little to be regarded." It was not until 1817 that exact measurements of the brightness of the various parts of the spectrum were published by Fraunhofer.

As might be expected the significance of luminosity in color vision is of profound importance. It is apparent to all that two white lights of different intensity will impress the senses in different degrees of brightness or luminosity. The measuring of that difference is called "photometry." When lights of different colors are compared, the differences might not be apparent but their measurements may be en-

tirely different. Such comparison is spoken of as "heterochromic photometry."

Heterochromic photometry has become of great importance since the invention of electrical lighting, and a considerable amount of attention has been devoted to it in the estimation of lights for various purposes. It is accomplished by means of an episkotister, which consists essentially of a metal disc containing alternate closed and opens sectors, thru which light may be diffused by rotation. When the episkotister is placed before two lights of different luminosities and rapidly rotated, an unpleasant "flickering" of each light is seen at certain rates of rotation. The disc is rotated until the flicker ceases before each of the lights, and comparisons are then made of the relative speeds.

SPECTRUM AS SEEN BY THE LIGHT-ADAPTED (PHOTOPIC) EYE.

The Spectrum; Hue, Luminosity, Saturation.

If a pure spectrum of moderate intensity is observed, a band of colors is seen. Of these, four are clearly defined as separate and distinct from each other: red, yellow, green, and blue, the red region consisting of the least refracted rays, the blue of the most refracted. Between the red and yellow we distinguish a region which is called orange. The gradation of red to yellow is gradual and it will be generally admitted that orange partakes of the natures of both red and yellow psychologically, the red element diminishing as we pass from red to yellow and the yellow element correspondingly increasing. Between yellow and green a somewhat similar gradation occurs, the yellow gradually becoming more and more tinged with green until we fail to recognize any yellow at all, and the color gives the impression of pure green. Passing further towards the blue an intermediate green-blue region is met with, showing the same gradual transition until the blue no longer gives an impression of green. Passing beyond the blue we gradually come to a region in which the predominant sensation is still of the order "blue," but it is not pure blue. It is called violet. Now violet is a color which occurs rarely in nature. There is, however, a color in nature which is often called violet, but which is really purple. True purple does not occur in the spectrum, but it can be obtained by mixing pure red light with pure blue light, and we can pass from blue to red thru violet and the mixtures of blue and red which are called purple and carmine.

We have thus traveled in a circle and returned to the original starting place, red. This is a very important fact, for it can be proved that with the help of the colors thus obtained, either pure or mixed with each other or with black in various proportions, all known colors and tints can be reproduced.

Speaking generally then, change of wave length causes a change in color, or in the hue or tone of a color. The tone changes most rapidly on both sides of the yellow, most slowly near the ends of the spectrum.

When we combine any color stimulus with another which lies more remote from it on our color circle, we obtain a sensation gradually diminishing in hue and increasing in greyness; that is to say, there is less and less "color" in the resulting sensation, until ultimately a color stimulus lying so far distant is reached that, when presented simultaneously with the other, it yields a perfectly colorless sensation of the black-white series. Every color sensation may be said to have its antagonistic color sensation, in the sense that when the corresponding stimuli simultaneously excite the same retinal area they produce merely a colorless sensation. The red of the extreme end of the spectrum and a certain bluish-green are antagonistic colors; so are purple and yellowish-green, violet and yellow, etc. These pairs of colors are also called "complementary," inasmuch as if one regards a sharply defined patch of one of these colors, and then turn the eye on to a colorless surface, the other member of the pair appears as a "negative after-image."

These observations suffice to indicate how color sensations may vary

not only in color (or hue) but also in "tint." One color sensation may be rich in color, while another, altho of the same color may be poor in it. This poverty is due to the simultaneous presence of some member of the colorless series. The pure spectral colors may be successively mixed with gradually increasing quantities of white light, until they become so pale that eventually no color can be distinguished. They are then said to become less saturated. A red sensation will change in tint owing to the simultaneous presence of grey. If the grey be light or white, the tint will be rose or pink; if it be dark or black, the tint will be brown. So, too, a blue, when fully saturated, yields a pure blue sensation; when mixed with white, greys or black, of the colorless series, it changes the sensation to a pale blue, or sky blue or a bluish-black tint. A "highly saturated" color is one rich in color and contains a minimum of white.

Yet, even when color stimuli are pure, that is to say, when the stimuli consist only of light waves of a uniform length and are freed by suitable filtering media from other waves and from white light, the color sensations thus obtained differ from one another in still another direction, namely in "brightness." Apart from the change in color the most striking feature of the spectrum is the difference in brightness or luminosity of different parts. The brightness varies with the intensity of the light, but if the intensity is increased beyond a certain point the colors also change in tone; not only does it alter the hue but also the saturation, so that eventually it produces only the sensation of white light. It is obvious that the purest yellow sensation is brighter than the purest red or any other saturated color sensation, and similarly that spectral green gives a brighter sensation than spectral blue. The totally color blind person sees the spectrum merely as shades of grey, which may be said to differ only in brightness. Indeed brightness is the one and only character in which sensations of the black-white series differ from one another.

So far, then, we have reached the following conclusions. The series of colorless sensations varies only in brightness; the colored series varies both in hue (color) and in brightness; and by combining stimuli which would separately yield colorless and colored sensations respectively, color sensations may be made to vary in tint.

From what has already been said we see that there are two thresholds of vision, a general threshold, the minimal stimulus producing the sensation of light; and a specific or color threshold, the minimal stimulus producing the sensation of color. The interval between them is spoken of as the colorless photochromatic interval.

Research has shown that, at any rate in lower animals, stimulation of the retina by light is accompanied by structural, chemical and electrical changes.

Structural Changes. The chief structural changes are the phototropic reaction of the pigment epithelium and the contraction of the cones. To these may be added changes in the Nissl granules of the ganglion cells.

When the frog's eye is exposed to light, the pigment granules wander into the cell processes between the rods and cones. The light effect is complete after 5 to 10 minutes' exposure. The retreat of the granules to the complex dark position takes one to two hours. The light effect is limited to the area stimulated, so that an "epithelial optogram," that is, an image of an object formed on the retina, owing to the bleaching of the visual purple, can be produced. These images have been fixed in excised eyes.

The violet end of the spectrum is more strongly "retinomotor" than the red end; the red light causes little reaction. Light on one eye causes wandering of the pigment in both. Light on the skin produces the effect in frogs; so, too, does electrical stimulation of the optic nerve, probably thru the centrifugal nerve fibers. The phototropic reaction of the pigment epithelium has not yet been proved to occur in mammals.

Chemical Changes. The most important chemical change caused by the action of light on the retina concerns those observed in the visual purple or rhodopsin. In the outer parts of the rods is diffused a substance highly sensitive to light called the "visual purple." This remarkable substance was discovered in the rods of the frog's retina by H. Müller in 1851. Boll, in 1876, first studied it exhaustively. It occurs in all animals which possess rods, from the lampreys to man; the cones do not contain it, it is present in the rods only. It is therefore absent from the fovea. The importance of this we shall see as we discuss the various theories of color.

The color of visual purple varies in different animals and under different circumstances, and gives different spectroscopic absorption bands. It is rapidly bleached by daylight, the bleaching of which is limited to the area exposed to the light. Light on one eye does not cause any bleaching of the visual purple of the other. In darkness the color becomes slowly restored, the visual purple being regenerated, but only on contact with the pigment epithelium. Regeneration commences in the frog in about half an hour and is complete in one to two hours.

FIELD OF VISION FOR COLORS.

The acuteness of form vision falls off rapidly in passing from the fovea to the periphery, but movements of objects having their images in the periphery are very readily observed. When an object is looked at directly, a sharp image is formed on the fovea and the immediately surrounding area. An object, therefore, which subtends less than 3° at the nodal point of the eye will form its image entirely upon the rod free area of the retina. Larger objects, subtending 4°-12°, will form their images on the macular region, in which only a few rods are present in the peripheral parts. Objects surrounding that fixated form images on the peripheral regions of the retina which are richly supplied with rods.

Thruout the field of view, the color sensibility of the normal retina, just as in form vision, differs according as the image, or the color, is at the fovea or is peripheral. The extreme periphery of the retina is totally color blind.

If we fix a point with the eye, and while we are steadily fixing it introduce a colored patch so that the color stimulus falls on the outermost region the patch is seen as a gray. Now within this totally color blind zone lies a zone which is red-green blind. If the colored patch be orange, it appears grey when the stimulus falls on the extreme periphery of the retina, but when introduced into less peripheral areas it appears yellow; in this zone a yellowish-green patch appears yellow, and a bluish-green, purple or carmine patch appears blue. Finally, at the center, we reach a zone which is sensitive to the red and green if they occur in the color stimulus. Foveal, or central, vision must therefore be clearly distinguished from peripheral or eccentric vision, for we have three zones in the retina, an outer, totally color blind, an intermediate, red-green blind, zone, and, a central zone, of complete color vision. These zones are more accurately described as zones of color weakness. Under proper conditions, the zones for red and green are found to be identical, and so are those for yellow and blue.

Interesting studies have been carried on in the use of colors to outline these zones, and in the gradation of the colors according to the manifestation of the changes in going from zone to zone. The results obtained from observations on the color perception variations in the fields of vision have been used with great advantage to substantiate the arguments advanced by the adherents of the "four-color theory."

The fields for colors are approximately concentric with that for white, their limits being determined by the intensity of the light, and as the colors change in appearance in passing from the point of fixation towards the periphery, the periphery is therefore dyschromatopic rather than achromatopic.

Those at the red end of the spectrum pass thru yellow to grey; those at the violet end thru blue to grey. Blue-green becomes green then yellow-green, then yellowish white.

The limits of the color fields vary not only with the intensity of the light, but also with the saturation of the color, and above all, the size of the object. If these are sufficiently great colors may be recognized, almost, if not quite, at the extreme periphery.

As already mentioned only the foveal region gives the unadulterated photopic reactions, unless the eye is very completely adapted to light, and all traces of scotopia eliminated from the peripheral field. Ordinary observations with the perimeter do not afford accurate details for comparison. Color pigments do not give the same fields as the spectrum colors with which they approximately match, since they are impure colors.

If light adaptation is rendered as complete as possible by exposure to bright sunlight, many points of interest are elicited. Under these circumstances it appears—within the limits of experimental error—that color matches, spectral or composite, which hold good for the fovea remain good when viewed eccentrically, but tho the matches remain matches the values alter, the colors changing in the mid-peripheral region, and becoming colorless in the extreme periphery. It may therefore be concluded, that in the photopic eye peripheral vision differs from central vision only in the direction of a diminution in sensibility, and not in the direction of a change in character of sensation.

Further, all color mixtures which appear colorless by central vision remain colorless by peripheral vision.

EVOLUTION OF COLOR VISION.

We now turn to an entirely different aspect of color sensibility—its development in the individual and in the race. A priori we should expect some light to be thrown upon the fully developed color sense of man by a knowledge of the stages thru which that color sense was evolved. The sources of our information on the evolution of color vision are few and the methods of investigation difficult and arduous. Only recently have the researches been carried out in a scientific manner and yielded results of particular value.

COLOR VISION IN ANIMALS. In the invertebrata, little has been done beyond recording that the animals have been attracted or repelled by lights of different wave length and intensity, as exhibited by movements towards or away from the light; experiment being confined merely to observation of their movements when the cage or trough is illuminated by lights of different colors.

We naturally appeal to the visual sensations of lower animals. Experiments which have been performed upon animals have hitherto thrown little light on the development of color vision; some deductions can be made, however, from the comparative study of the structure of the visual organs. One great difficulty lies in determining whether differences in the behavior of the animals are due to differences in color or in brightness merely. It is only in recent work that adequate attention has been paid to this point. Another and insuperable difficulty is our powerlessness to determine sensation qualities in animals other than ourselves. Even among men, there is reason to believe that no two subjects have precisely the same color sense; all the more so when dogs, mice, birds or crayfish are said to be capable of distinguishing one color from another, we are not in the least justified in concluding that the various colors appear equally different to these animals, or that their experiences of color are comparable to our own.

Experiments on the color vision of the higher animals have been performed by training the animal to react in a prescribed way, say to enter a compartment colored in a given hue, perhaps rewarding or punishing it according as it enters the right or wrong compartment. When once the animal has learnt to react to a given color, the experimenter studies the degree of correctness with which it is able to react

in the simultaneous presence of one or more colors or greys illuminating other compartments. In other experiments, especially on lower animals, the reaction is obtained by offering food on tiles or in forceps of a given color, or by coloring the food.

It is impossible to set forth here the various conclusions which have been reached by different workers. They agree in finding that in regard to color sensibility animals differ widely from one another and from ourselves. The most recent experiments on dogs appear to show that during the early days of training they react so exclusively to differences of brightness, that at this stage of experiment they appear to be totally color blind.

It is only later, after a period of prolonged training, that they show themselves capable of reacting to differences of color. There is no evidence in all the work which has been devoted to animal color vision that red and green vision is generally weak or sometimes absent. Yet one might have expected that red-green vision would prove to be the last in the course of evolution to be acquired, considering the relatively great frequency of red-green blindness in man. Thus neither in animals nor among children or savages, is there evidence of the evolution of the color sense along a definite path.

The Color Vision of Primitive Races. A study of color vision of primitive races may throw some light on the evolution of visual sensations. It may be that some primitive races are in a condition of arrested development of vision, as of other faculties. We have only just crossed the threshold of this part of the investigation and it is to be hoped that no time will be lost in carrying it forward, lest the material for the research be obliterated by the march of civilization.

Interest in the color vision of primitive people was first aroused by Gladstone, in 1858, who in his "Studies on Homer and the Homeric Age," drew attention to the vagueness of the color terminology of Homer, and concluded that the ideas of color at that time must have been different from our own.

It may interest us to read what Gladstone says of Homer's sense of color: "He knew but little and vaguely of the differences of colour, except as approximations to the opposite ideas of light and darkness, both of which he grasped firmly, and turned very largely to poetic use. He never gives an epithet of colour to a flower; never calls the skies blue; and there is no work in the poems which would justify an assertion, that he had any approach to a distinct perception either of green or of blue. Yet so well did he employ his comparatively scanty materials, that his visual imagery is both abundant and highly imposing."

Several words occur in the Iliad for red and one word definitely used for yellow; but a much less definite word for blue or brown. These peculiarities of color terminology have since been found not only to be characteristic of Homer, but also to occur in ancient writings in very different parts of the world. The conclusion has consequently been drawn that our color sense has been evolved in comparatively modern times, that the sensations of red and yellow arose before the sensation of green, and that only at a much later date did the sensation of blue develop.

It has been suggested that the color names of the Homeric Greeks and uncultured peoples might be explained by environment. The Achaians were a subbarbaric race who had reached the stage of culture at which the use of pigments is practiced, but who only employed red and a reddish purple in staining or dyeing. Their color vocabulary is exactly accommodated to such a stage; and Gladstone believed that they could not have understood real colors by their apparent color terms, because the words descriptive of color are used loosely. The later Greeks were themselves aware of the deficiency in their color vocabulary. The superior power of red to strike the attention may be due to the fact that red objects in nature are rare, while blue and green are constantly spread out in large tracts of sky and sea and foliage. Further, while many

of the rare red objects, blood, fruits, birds, ironstone, minerals, etc., are of practical importance, and while the abundant green objects are present in endless variety of tones, shades and shapes, many of which call for the exercise of discriminatory perception, the widespread blue surfaces of sky and sea are commonly of uniform tone, and in hardly any circumstances is the discrimination of blue tones of practical importance to men of the lower cultures.

Altho the color sense of the ancient Greeks is beyond investigation we can fortunately determine that of other primitive peoples of the present day, most of whom, it is interesting to note, show the same or similar defects in color terminology as those deduced from the ancient writings of the civilized world. Certain tribes of India, for example, have a very definite word for red and a somewhat less definite word for yellow; they have a word for green which may also be used for brown and grey and occasionally for black, but they have no word for brown, violet or light blue. The words they use for light blue are those they use also for green and black. So, too, among other tribes, definite words exist for red and yellow; many words are used to describe green, some of which are applied to blue and black, while violet and brown have no definite names.

Our own Fellow, Dr. William Henry Furness, whose untimely death occurred only so recently, in his book on his life among the Yaps, of that island among the Carolines now subject to international dispute, has this to say of the color vision of the natives of that far away Pacific island:

"It must be indeed a strange world to live in where black, blue, and green are identical in colour; yet apparently it is in such a world that men of Yap live. As far as the colour of their heads and hands is concerned they might as well be Jumblees, 'whose heads,' according to Edward Lear, 'were green and whose hands were blue'; to them such freaks would not be amiss; for all I could make out, the verdant cocoanut frond, the azure sky, and their own dark bodies are all of one color. To them blue and green are only lighter shades of back; the word rungidu is applied to all three."

"One day, to test their perception of colours, I painted squares in my note-book of every colour in my paint box; on asking many men the names of the colours, I learned from the answers of all, that only black, red, yellow, orange and white had distinctive names; all the shades of blue and green were ignored; or, occasionally, they would say a deep blue was the colour of the deep sea, and light green was the color of the young cocoanut leaves, but in the abstract these colors were both rungidu. The carmine was at once picked out as rau; emerald green, ultramarine blue, and black were all rungidu, chrome yellow was rengreng, orange was mogotrul, and white (the black paper) was vetch-vetch; the white foam of the breakers was known as uth."

"They were never at loss in naming or distinguishing the color, and gave such qualifying adjectives as 'moldy' colour; 'dirty' colour; 'close to the color of blood'; the strangest and most poetic was an adjective applied to rose madder, which one man said was a 'lazy' colour. When asked to explain, he replied: 'When a man feels sleepy and lazy and rubs his eyes, he sees this color.'"

"Among women, however, I found that some did recognize blue and green as separate colours, and gave distinctive names to them."

It has been suggested that the deficient sensibility of colored races to blue arises from the stronger pigmentation of the "yellow spot" of the retina, in consequence of which blue and green rays of light are more strongly absorbed on reaching the retina in comparison with red and yellow, and thus a certain insensitivity to blue and green would arise. It is quite likely that this explanation is correct. But we cannot, if we adopt it, attempt to derive defects of color nomenclature

from the same cause, inasmuch as some European languages, as for example, modern Welsh, have no word for blue, or, as in certain parts of Germany, they confuse violet and brown.

Finally we may turn to the color sense of European infants and children in the hope of further additions to our knowledge. Infants from 22 to 60 weeks old have been tested by holding or placing before them pairs of woolen balls or wooden bricks of different colors, and by observing which color is preferred. A reward in the form of a taste of sugar, was given after a ball had been grasped or a brick picked up. Prolonged experiments with colored objects, and with objects painted in various shades of the colorless white-black series, appear to show that at an early age, probably long before the sixth month, infants grasp red and yellow objects in preference to green and blue and colorless, even bright white objects; while blue is at this stage hardly if at all preferred to white objects. Probably at this, and certainly at a somewhat later stage, the infant's preferences are dictated not by brightness but by color. For example a babe, of about the 55th week, was found to grasp a yellow brick far more frequently than a white one, when both were simultaneously exhibited, altho the latter must have appeared brighter to it than the former. On the other hand, a blue brick, altho at first picked up more frequently than a white one, soon lost favor. Thus prolonged experiment showed that blue was at first preferred solely on the score of novelty of color, while yellow was chosen with increased instead of with diminished frequency at successive sittings. The same babe distinctly preferred a brighter to a colorless brick. Consequently the preferences for colored objects at all events at this age, are determined by color, not merely by brightness.

Such experiments, however, afford little evidence of color sensibility. Because a babe picks up blue and grey equally often, or because at an early stage it picks up reds and yellows in preference to greens and blues, we cannot infer that it is color blind, or less sensitive, to greens and blues. It might well be that reds and yellows are more interesting and attractive than greens and blues.

DEVELOPMENT OF COLOR VISION IN THE CHILD.

Darwin first pointed out that the power of distinguishing colors is a very late accomplishment in childhood; he found that his children were unable to name colors correctly at an age when they knew the names of most common objects.

English children of five years of age and upwards have been investigated by the same test as has been applied to primitive people for determining the color thresholds, but the results do not differ from those obtained from English adults as regards their relative sensitivity to red, yellow, and blue. We find no trace of that remarkable deficiency in sensitivity to blue, and slight insensitivity to greenish yellow, which we have found among the adults of colored people. English children have also been tested for color blindness by matching wools, and have been found to make the same confusions in respect to bluish colors as occur among primitive peoples.

We seem justified, then, in concluding that deficient interest in blues and greens is mainly responsible for the defects in color vocabulary and the color matches characteristic of primitive peoples. But we find reason to doubt whether the defective sensibility to blues and greens which exists in primitive peoples can also be attributed to lack of interest in the stimuli concerned, and hence whether with sufficient interest or experience the thresholds would have changed their value. There is no doubt that practice increases the facility of discriminating faint shades of color, just as it is the basis of the education of the tea-taster or the wine expert. It is impossible to foretell the potentialities of the human mind which are undeveloped owing to deficient interest or practice. Under a British teacher, for example,

the Murray Island children proved themselves rather more expert at arithmetic than English children of the same age, but the islanders had no words in their own language, save "one," and, "two," to express numbers.

Is it possible then, that the low threshold for blue is due merely to their accustomed general inattention to this color? The probability is that this explanation is inadequate, for as we have seen English children are similarly unattracted to blue without, however, showing deficient sensitivity to color. We can but conclude that the special insensitivity to blue and to green is due to some special cause, perhaps to pigmentation of the sensory epithelium as has been already suggested.

There is no evidence that man has acquired his color vision say by an early evolution of the red, or blue, sense, later by the appearance of the green, and lastly by the appearance of the blue, or red, sense. Perhaps the earliest condition was one of colorless vision, all objects appearing as shades of homogeneous light. It was only later that the growing experience and needs of the race and of the individual enabled him to differentiate colors one from another, and to distinguish color from colorlessness. We have learned that, tho red and green vision is so unstable in man, red is the most attractive of all colors. No doubt, we have to distinguish between the primary physiologic bases of color vision, and the fullest possible manifestation of their respective functions. The former may have been installed, long before the individual or the race reached the stage when it was capable of appreciating all the various sensations which such an apparatus permitted him to differentiate. That is to say, we have to distinguish the evolution of the upper from the lower systems of that vast unravelled complex, the cerebroretinal apparatus, which is responsible for our color vision.

The materials for this lecture have been gathered in the past five years from various sources, but chiefly the following works, from which I have taken much bodily. My apparent discourtesy in not acknowledging by name the authorship of the paragraphs used will not, I trust, be taken amiss; the facts as set forth are in as simple phrases as it is possible to express what has by now become part of the established body of scientific doctrine.

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NOTES, CASES AND INSTRUMENTS

THE REPAIR OF CERTAIN CASES OF SYMBLEPHARON ASSOCIATED WITH TRAUMATIC PTERYGIUM.

LEE MASTEN FRANCIS, M.D.,

BUFFALO, N. Y.

Read before the American Academy of Ophthalmology and Oto-Laryngology, October, 1921.

This paper is concerned in certain cases of adhesion between the lid or lids and globe, in which there is also a connective tissue bridge extending to the cornea, forming a traumatic pterygium. Such conditions sometimes follow deep burns of the lids and eyeball, and require operative attack because of impairment of function. Two types are usually encountered, each requiring a somewhat different technic:

A. An adhesion between a lid, usually the lower, and the globe with no involvement of a canthus.

B. An adhesion at a canthus, usually the inner, with involvement of both lids.

Type A:

The method employed is that described by Arlt, and quoted in most text books on ophthalmic surgery, with minor modifications.

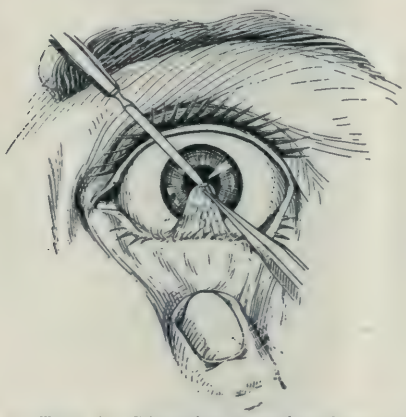

Fig. 1. Type A. Dissecting pterygium from cornea.

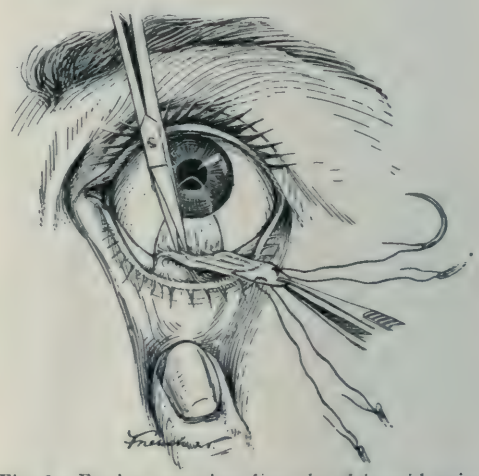

Fig. 2. Freeing pterygium from the globe with scissors.

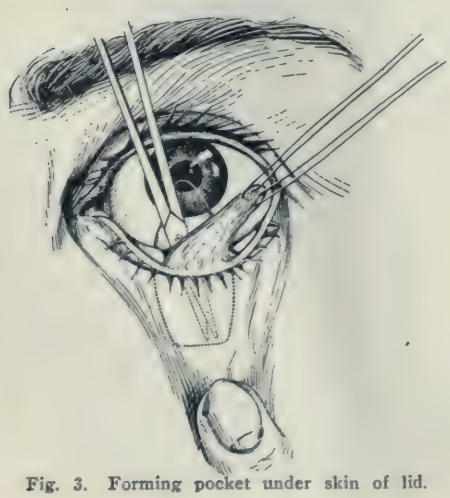

Fig. 3. Forming pocket under skin of lid.

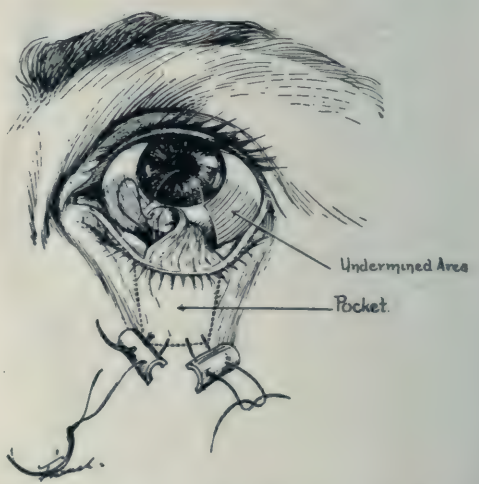

Fig. 4. Sutures brought out thru skin of lid.

1. The pterygium is dissected from the cornea in the usual way with a Graefe knife. Instead of stopping at the limbus, the dissection is continued by the aid of scissors until the entire wedge is freed from the globe down to the fornix. Continuing with the scissors, a sufficiently wide pocket is fashioned under the skin of the lid, well below the level of the fornix. Figs. 1-2-3. It is important to make this pocket deep to minimize subsequent contraction.

2. The under surface of the tongue so formed is thinned by the removal of unnecessary tissue. Double armed sutures are placed in the tip of the pterygium, and the flap is tucked into the depth of the pocket formed. The needles are brought out on the skin surface and tied over sections of small rubber tubing. Fig. 4.

3. The conjunctiva on either side of the denuded bulbar surface is undermined, and brought together by mattress silk sutures. Fig. 5.

Fig. 5. Conjunctiva brought together with mattres suture.

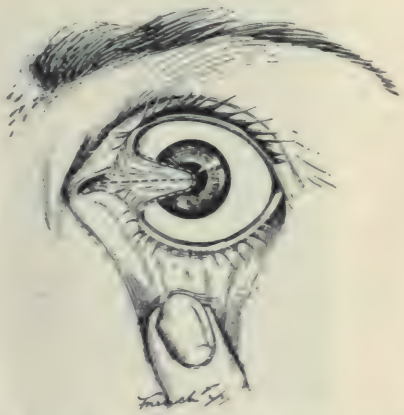

Fig. 6. Type B. Involving canthus and lids.

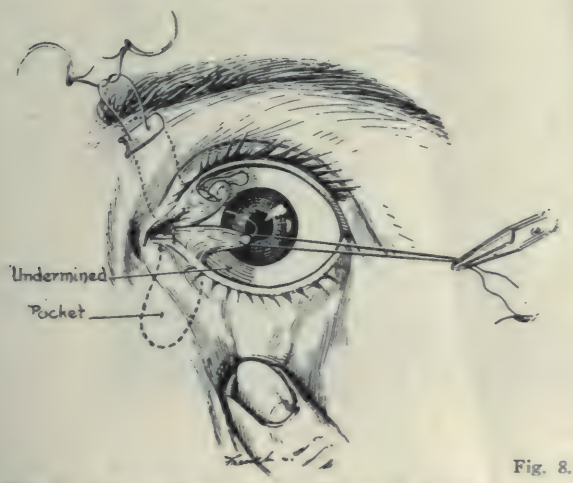

Fig. 7. Sutures placed above. Extent of pocket below.

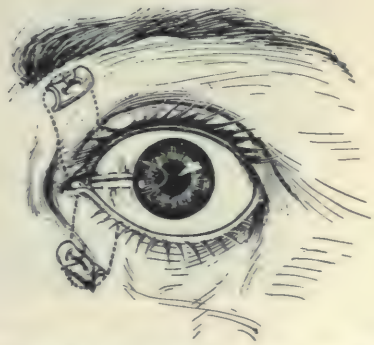

Fig. 8. Sutures all tied, those thru lids over rubber tubing.

The suture next to the fornix includes episcleral tissue to insure anchorage.

Type B: (involving canthus and lids—Fig. 6).

1. The pterygium is dissected from the cornea and globe as described above.

2. A pocket is fashioned under each lid as described above. Fig. 7.

3. The tongue, having been freed from the adventitious tissue is divided in its long axis, down to the base. Fig. 7.

The upper portion is tucked into the pocket formed in the upper lid, and becomes a partial lining to the lid. The lower portion is similarly transplanted downward into the pocket made below, covering a similar defect in the lining of the lower lid. Fig. 8.

4. The denuded bulbar surface is covered by conjunctival flaps in the manner described. Fig. 8.

The corneal site of the pterygium is curretted in the usual way, atropin instilled and some ointment like White's placed in the conjunctival sac. Both eyes are covered for a few days. The sutures may be removed after the fourth day.

SUBLUXATION OF EYEBALL.

PAUL S. MERTINS, M.D., F.A.C.S.

MONTGOMERY, ALA.

Rarity of the condition is reason for reporting this case. Henry Harold, (col.), aet. 38, shoemaker, called on account of a mild catarrhal conjunctivitis.

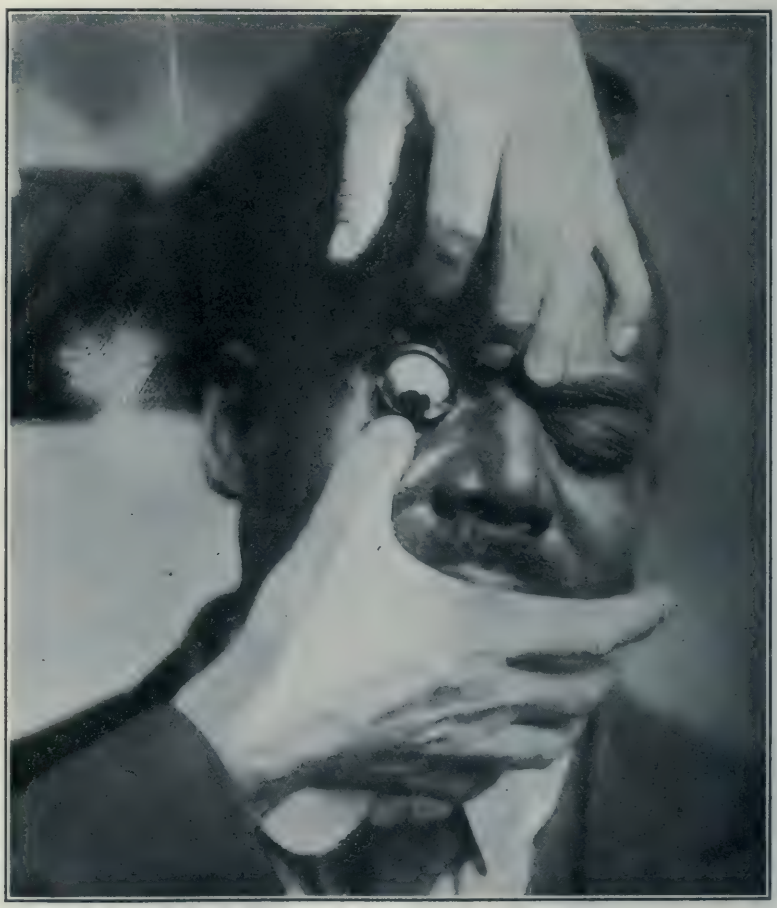

Fig. 1. Subluxation of right eye (Mertin's case).

He was six feet tall, well developed, well nourished, and of rather more than average racial intelligence. He had never had previous eye trouble, except snow glare conjunctivitis during the Spanish-American War. His general health was excellent and the shape of his head was good. There was nothing unusual about the expression of his eyes.

On retracting eyelids of right eye with

fingers, to expose the conjunctiva, there was a rather rapid advance of the bulb, until it had passed the strait of the lids. So rapid was the advance that the bulb seemed to fairly pop out of the orbit. Holding the lids open with the fingers the subluxation was easily reduced by pressure on the bulb. There was some blepharospasm and the patient complained of a slight ache in the eye for a few minutes.

Examination of left eye, in like manner, was followed by the same rapid advance of the bulb until it passed the lids.

There was no exophthalmos, tachycardia, tremor, or enlargement of thyroid gland.

Measuring from fixed point of the external bony edge of the orbit, there was noted an advance of six millimeters of the bulb when the patient opened his eyes as wide as possible. Vision in each eye was 20/20 with 0.50 cyl. ax. 90°. Fundus was normal. There was orthophoria. Examination of nose and accessory sinuses was negative.

The accompanying photographs illustrate, to a degree, the extent of subluxation. In making the photographs, care was taken not to let the bulb pass the strait of the lids, on account of the slight pain which was experienced. The photographs illustrate the normal appearance of each eye, as well as the subluxation of bulb, when the lids were retracted.

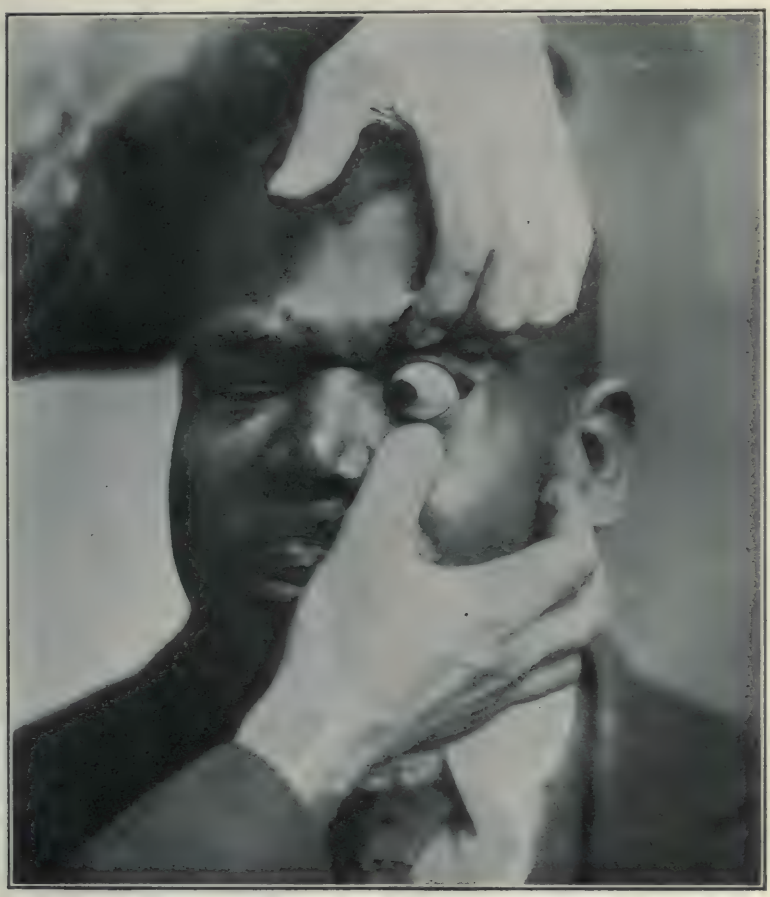

Fig. 2. Subluxation of left eye on retraction of lids.

The patient gave no history of spontaneous luxation of the eye, and was not aware of the anomaly.

T. E. Oertel, (Amer. Jour. Ophth., Series 3, Vol. 3, No. 11), reports a case

of spontaneous luxation of eyeball in a negress. His patient died suddenly, without known cause, and at autopsy, a small cerebellar tumor was found. Her first spontaneous luxation had occurred two months previously; no pathologic condition other than cerebellar tumor was noted.

Oertel reviews the literature from 1900 and finds reports of nine cases, besides his own. Two were insane, one had cerebral gumma, one had exophthalmic goitre, one bilateral exophthalmos without Basedow's disease, and in four cases no mention is made of any pathologic condition.

The suggestion of Levin, quoted by Oertel, of tarsorrhaphy in those cases of frequent spontaneous occurrence seems practical.

NEW KNIFE NEEDLE.

J. E. Hileman, M.D.,
SAN DIEGO, CALIF.

Having had considerable difficulty in getting satisfactory discission needles, I had some made from a special design, which are far superior to anything I have ever used before.

They are fine and delicate, with a special sickle shaped curve, needle point, double cutting edge, very thin blade with no shoulder at heel. The blade being only four millimeters from point to heel, gives great facility for movement in every direction when in the eye, with the advantage of a cutting edge on either side. On account of thinness of blade and lack of obstructing shoulder, its introduction into the eye is made with the greatest of ease and without the loss of aqueous during the manipulation. I am sure if my colleagues will try this needle they will be highly pleased with it.

F. A. Hardy & Co. of Chicago made these needles for me in a superior workmanship manner.

PRIMARY VACCINIA OF THE CORNEA.

Noxon Toomey, M.D.,
SAINT LOUIS, MISSOURI.

The extensive destruction of the cornea and deeper tissues that follows upon the primary inoculation of vaccine lymph into the cornea is so serious, that we believe it should be brought to the attention of the profession. The accidental vaccination of the cornea can often be prevented, if those who handle the virus are mindful of what may result from carelessness. The modern method of marketing vaccine virus in capillary glass tubes favors the accidental inoculation of the cornea. The infecting wound is produced by a splinter of glass flying into an eye of the physician or bystander when one of the ends of the capillary tube is snapped off. That the tube of virus should be held so that flying splinters of glass will not strike an eye, is suggested by common prudence. Furthermore, we urge that no physician should consider himself immune from corneal vaccinia just because he had a successful vaccination a short time before. Even in well vaccinated persons, the virus when inoculated into the cornea is likely to give rise to a slight (anaphylactic) reaction sufficient to cause temporary distress or even slight permanent injury.

A case of vaccinia of the lids, recently seen with Dr. James Moores Ball, led the author to collect the literature on the subject of vaccinia of the ocular apparatus. The case reports in which the cornea was the seat of primary vaccinia are given below. Six of the eight cases were due to glass splinters from vaccine tubes, one to an ivory vaccine point, and one to a needle shot from a mechanical vaccinostyle.

The histopathology of experimental vaccinia of the cornea in animals is very fully discussed by the authors below:

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Story. British Medical Jour., 1:346. 1907.
Menzies and Jamison Ibid, 1:198. 1907.
Caillaud. La Clinique Ophtalmolog., Jan. 10, 1913. Abst. in The Ophthalmoscope, 13:150.
Morax. Ann. d'Oculist., 152:345. Nov., 1914. Abst. in Ophthalmic Review, 35:152-153.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

FEBRUARY 13TH, 1922.

DR. STANLEY SMITH, Presiding.

Symblepharon.

DR. E. B. HECKEL exhibited a case of pterygoid symblepharon in an adult following a burn more than a year ago. The patient had followed instructions to stretch the pedicle of tissue by pulling the lower lid away from the globe, so that now there is little or no interference with eye movement. Later, Dr. Heckel will dissect the symblepharon from the globe, unite the edges of the conjunctiva under it and leave the free end of the pedicle to slough off or atrophy. He reports good results from this method, which he has practiced for some years.

Discussion.—DR. E. E. WIBLE is of the opinion that the method is applicable only following superficial burns, and that the symblepharon from a deep burn would not permit of such stretching.

"Prohibition" Amblyopia.

DR. E. B. HECKEL exhibited a case of prohibition (wood alcohol) amblyopia in an adult male negro. Eyegrounds and vision are now practically normal. Treatment was elimination, and strychnia internally.

Discussion.—DR. MEANOR, believes that in true wood alcohol amblyopia vision does not return.

DR. MARKEL had a patient who had taken a gill of wood alcohol, followed with pain in the stomach, nausea and vomiting, and blindness the next morning. There was pallor of the discs. Under eliminative treatment, vision returned to nearly normal.

DR. MCMURRAY had a case of wood alcohol poisoning which went on to optic atrophy with completely white nerves.

DR. SMITH thought Dr. Heckel's case of too fleeting character to be typical of wood alcohol amblyopia. He believes the patient's fundus to be now normal.

Intraocular Tumor.

DR. C. F. BERNATZ reported a case of glioma of the retina in an adult luetic, emphasizing the fact that, in the presence of a four plus Wassermann, we should not be unmindful of etiologic factors other than syphilis. W. D. K., male, aged 53, a dancing teacher, on April 5th, 1921, complained of diminished vision in left eye, with supraorbital headaches and aching of both eyeballs. Family history was negative. Personal history was negative except for the ordinary diseases of childhood and a four plus Wassermann. Patient had been under antiluetic treatment for several years, which included intravenous injections of salvarsan and mercury and iodides by mouth.

External examination showed both eyeballs free from inflammation; pupils responded to light, accommodation and convergence. Response to light was slightly sluggish on left side. Ophthalmoscopic examination showed right eye media clear, no changes in discs, fundus slightly congested. Left eye media clear; detached retina, superior nasal portion, disc good color, arteries and veins normal in caliber. Vision, with glass as worn, was 20/30 in right eye and 20/100 in left eye. Transillumination of left eye showed no shadow present. Vision remained unchanged until August, when vision in left eye failed rapidly and the detachment of the retina increased to a degree which obscured the disc. Transillumination showed no shadow.

On Sept. 20th, 1921, patient suddenly developed severe pain in left eyeball, with headache and vomiting. Examination showed secondary glaucoma, with tension increased to plus three. Transillumination showed darkness in all portions of the eyeball. Glaucoma did not respond to treatment. Blood

pressure was normal. Consultation with another physician brought up the question of differential diagnosis between hemorrhage into eyeball, gumma or tumor formation. Hemorrhage was excluded by ophthalmoscopic examination. To exclude gumma, it was suggested that iodides and mercury be increased to point of tolerance as rapidly as possible. On account of the patient having been on active antiluetic treatment for several years under the supervision of a qualified urologist, it was the writer's opinion that little help could be hoped for from this line of procedure. Feeling confident that a tumor was present in the eyeball, enucleation was suggested as the safest alternative. The patient agreed and eyeball was removed at the earliest possible moment. Laboratory examination revealed the presence of a "glioma" springing from the nasal portion of the retina with beginning metastasis in and around the optic nerve.

Discussion. — Dr. Weisser thought the case unusual from the standpoint of the age of the patient, and that metastasis had occurred so early.

Perforating Wound of Cornea.

Dr. E. E. Wible reported two cases. Case 1, A. G. aged 10 years, was admitted to the hospital within half hour after the accident. An older playmate was attempting to drive a nail, which ricochetted and struck the patient's left eye, causing a vertical laceration of the cornea, about 4 mm. in length, extending downward from the eleven o'clock point. There was no protrusion of the iris. The eye was irrigated, atropin solution instilled and a compress bandage applied. Patient was extremely refractory and on the fourth day there was a prolapse of the iris. An iridectomy was done, and on the following day the entire cornea was opaque. The cornea slowly cleared in about a week, except for a band of infiltration nearly 2 mm. in width along the line of the wound. Patient left the hospital on the twenty-first day. Injured eye, six weeks after the accident, is free from inflammation, and has a faint white cicatricial line at the site of corneal laceration. Pupil is slightly pear shaped and vision is normal.

Case. II. J. S. aged 18 years, was admitted to the hospital with a history of having been struck in the left eye with a long, light hollow stem of a weed which was thrown spear fashion by an associate. There were some abrasions of both lids and a laceration of the cornea in its entire diameter, extending downward from about the eleven o'clock point. Very little reaction from injury ensued, and there was no prolapse of iris. On the third day, opacification of the lens began underneath the line of the corneal wound and slowly extended. It has seemingly stopped at present, leaving a clear segment on the temporal side of about one-sixth of the lens. It has now been seven weeks since the accident, and needling has been deferred until there are indications of arrest of absorbtion of the cataractous lens. There is a rather wide cicatrix resulting from the corneal wound. Comparing the two cases: The first, apparently the more severely injured, with more marked reaction, and intractable patient, no cataract ensuing, a smaller cicatrix of the cornea, and normal vision. In the second case, while the laceration was longer, there was little reaction, patient was tractable, there was no prolapse of iris, cataract ensued.

Traumatic Atrophy of Optic Nerve.

Dr. E. A. Weisser. Mr. M. aged 42, laborer, on Jan. 24, 1922, fell 10 feet from a ladder, striking his head over the left eye, producing a laceration one inch long over the eyebrow and causing loss of speech for twenty minutes. Clinical and X-ray examination revealed no fracture or injury to the eyeballs or sockets. General surgeon's diagnosis was concussion of the brain. Patient claimed immediately that he was pratically blind in the left eye. External examination of the eyes showed both corneae clear, pupil of right eye 3 mm. in diameter and responsive to light, accommodation and convergence; pupil of left eye 5 mm. in diameter, did not respond to direct light, responded to indirect light and to accommodation and convergence. Ophthalmoscopic examination showed media of both eyes clear and fundi negative. On Feb. 2nd, 1922, ophthalmo-

scopic examination showed beginning optic atrophy in left eye. When last seen, about five days later, condition was about the same. Diagnosis is that left optic nerve was injured, either by direct force or by pressure from hemmorrhage into the sheath, somewhere back of the entrance of the central retinal artery but anterior to the chiasm.

Dr. J. C. Markel reported that pathologic examination of the nodules taken from the lobe of the ear of his patient with tumor near the pituitary body, reported at the November, 1921, meeting (A. J. O., Jan. v. 5, p. 41), showed them to be *fibroma of the skin*, with no etiologic relationship, therefore, to the intracranial growth.

George H. Shuman, M.D.,
Secretary.

SAINT LOUIS OPHTHALMIC SOCIETY.

Meeting April 29, 1921.

Dr. A. E. Ewing, Presiding.

Eye Conservation in Industrial Occupations.

Dr. E. H. Higbee read a paper on this subject.

Discussion: Dr. F. E. Woodruff. I desire to call attention to the necessity of determining the vision of men prior to employment. A man comes in with an eye injury. Examination shows that his vision is much impaired, but not in all probability as a result of the injury. But the arbitrator is interested only in the present vision. The attorney for the company asks you, "Did the injury cause that loss of vision?" You may truthfully say "No." But the attorney for the other side says, "What is his vision?", and that vision is the basis upon which the arbitrator adjusts the compensation. It behooves us to try to enforce the determination of vision of men prior to employment so that there may be a record for future reference.

Dr. A. E. Ewing: I cannot understand why it is that the companies themselves do not insist that all prospective employees submit to a visual test prior to employment. If vision is poor, the prospective employe should be informed that it would be best for him to have his eyes examined. This plan would work for the man's own protection.

Dr. Wm. H. Luedde: It is important in certain occupations, to test peripheral as well as central vision. For instance, motormen should, as a matter of course, be examined in that particular, but inquiry at the United Railway office indicates that an examination of the field has never been included as part of the preliminary test.

Dr. E. H. Higbee: Physical examination including visual tests before the man goes to work is absolutely necessary, as is the examination of the fields. In the plant of the American Car & Foundry Company, there are a great many traveling cranes from which depend large hooks which would probably not be seen by a man with a contracted field. Traumatic cataract is and always will be a difficult problem. As a rule, in industrial work, I do not remove a traumatic cataract.

Sympathetic Ophthalmia; Recovery.

Dr. H. S. Hughes presented a case report.

Discussion: Dr. John Green, Jr. I think that there are some cases of sympathetic ophthalmia in which salvarsan is very efficacious. I recall one colored girl we had several years ago at Barnes Hospital, who resisted treatment by mercurials, salicylates and the usual local treatment, who got well rather rapidly after several doses of salvarsan. Dr. Harbridge, of Phoenix, Arizona, has asserted that in cases of sympathetic ophthalmia there will be found some type of focal infection. He believes that sympathetic ophthalmia will not occur in the absence of focal infection. It has been my impression that penetrating wounds of the eyes in children are more dangerous, and more likely to lead to sympathetic diseases, if the child is undernourished, pale and anemic, with adenoids and infected tonsils.

Dr. Wm. F. Hardy: The interesting case of Dr. Hughes brings up three points. One is the treatment that he carried out, which, in my opinion, is

thoroly commendable, namely: saturation with salicylates, and the use of salvarsan and mercurials. The second point is the occurrence of sympathetic ophthalmia after evisceration. I think it much safer to do a clean cut enucleation. I have never been able to convince myself of the superiority of evisceration in securing a better stump, and hence a more mobile and prominent prothesis. The third point is the occurrence of optic neuritis, which was probably a sympathetic optic neuritis and not one due to salvarsan, as suggested by Dr. Hughes.

Dr. F. E. Woodruff: In these injuries we have not done our duty if we overlook possible foci of infection in the teeth and sinuses. I have come to the conclusion that all cases of sympathetic ophthalmia harbor focal infections. I have seen three cases within the last two years, all presenting focal infections. In no case have I been obliged to remove the offending eye.

Dr. W. H. Luedde: I was surprised to find that in the War Manual of Ophthalmology, evisceration was offered as the preferred method. The stump after evisceration is of little or no advantage. I have seen two or three cases of sympathetic ophthalmia following eviscerations.

(1) Keloid of Cornea; (2) Transverse Gunshot Wound of Both Orbits, Proliferating Chorioretinitis.

Dr. H. D. Lamb presented two case reports. (See p. 253.)

Discussion: Dr. Julius H. Gross: A young girl tried to commit suicide by shooting herself in the right temple. The right optic nerve was severed and the left globe was injured from contact with the bullet, producing a ruptured choroid and retina. She retained vision in the lower part of the field of the left eye enough to enable her to go about.

Dr. H. D. Lamb. As to the term, "proliferating chorioretinitis," the first mention I found was in the ophthalmoscopic work of Adami. The older text books speak only of "proliferating retinitis"; other authors in speaking of similar appearances give them the name of "plastic choroiditis." Lagrange has attached to it a definite picture and fully explained its pathology. This deep, large, prominent, thick plaque of connective scar tissue has a very characteristic appearance and one can hardly make a mistake in diagnosing it.

John Green, Jr.,
Editor.

WILLS HOSPITAL OPHTHALMIC SOCIETY.

December 6th, 1921.

Dr. Burton Chance, Chairman.

Macular Reflex.

Dr. P. N. K. Schwenk exhibited a case of so called "searchlight" or "policeman's lantern" reflex, at the macula in the left eye of a youth. The left eye in this case was myopic, while the right was emmetropic; the reflex was present in the left eye only.

Myopia With Staphyloma Verum.

Dr. Burton Chance showed a case of myopia accompanied by staphyloma verum, in either eye. These cases are rather unusual, and the true bulge in the sclera may be seen and judged by the dip which the retinal vessels take in crossing the edge of the ectasia.

Facial Palsy.

Dr. F. C. Parker presented a case of double Bell's palsy.

Discussion: Dr. Schwenk stated that if the lagophthalmus were peripheral in origin, as it is with a Bell's palsy, we should look in the ear canal for the pathology. Dr. Adams remarked that if the palsy came on suddenly it must be Bell's, but if slowly it was probably not a Bell's.

Traumatic Cataract.

Dr. Parker also exhibited a case in which an operation for traumatic cataract had been done with a resulting corrected vision of 6/6 in the aphakic eye. It was a question if it would be possible to correct this eye and give the young man binocular vision. When both eyes were corrected, there was a diplopia in all directions of the gaze except straight ahead. Dr. Schwenk thought that it would not be the proper

thing to correct this aphakic eye for the images in the two eyes are of different sizes.

Supernumerary Punctum.

Dr. B. Chance showed a case of supernumerary punctum and canaliculus in a young Italian girl, who had been under treatment at his clinic, a number of months previously, for the relief of dacryocystitis which he had relieved by extirpation of the lacrimal sac. During the dissection it was noticed that an additional punctum was present in the lower lid, which communicated with the canaliculus by a narrow tube. The canaliculus itself had been slit by another surgeon sometime previous to the child's admission. A probe inserted could enter the canaliculus but not directly the lacrimal sac; there being no communication obtainable into it. The opening of the extra tube was distinctly ciliated and led off at about 4 mm. from the normal punctum; it could readily be perceived when a solution of fluorescein was allowed to flow from the conjunctival sac.

Pigmented Corneal Cicatrix.

Dr. B. Chance exhibited a young man, in the cornea of whose right eye is a somewhat branching black cicatrix. He had been struck by a piece of rock while working in the mines four years previously. The iris on the nasal side is adherent to a capsulolenticular membranous sheet, which obscures the fundus. This sheet is full of vacuoles or bubbles. As the patient had reported at a late hour his case had not been fully studied, but was exhibited to show the pigmented cicatrix.

Retinochoroidal Sclerosis.

Dr. B. Chance exhibited a case of extensive retinochoroidal sclerosis in a man about 45, whose sight has been failing for the past 15 or 20 years. He had used glasses with satisfaction for many years, but recently he has not been able to see well, late in the day, so he came with the expectation that his sight might be much improved by new glasses. The visual acuteness equalled 6/20; in the darkened room, 6/30. The peripheral acuteness is greatly lowered; the form fields are contracted and all colors are but feebly perceived, except at fixation. With colored wools he has made prompt and correct selections, and his color sensations are as acute as ever. The fundus of each eye is of a reddish brown tint, due to the absorption of the epithelium and the destruction of the capillary layer with the consequent exposure of the stroma. There are no areas showing complete destruction; the choroidal vessels are everywhere visible, and, at several places near the disc, the walls of the vessels are opaque, causing them to appear like white bands as tho they had been obliterated. A few of the vessels are accompanied by white lines. Here and there clumped and stellate masses of pigment overlie the vessels. The discs are decidedly sclerotic. With lenses correcting a moderate compound presbyopia the acuteness of vision reaches 6/7.5, in each eye, and type 0.50 can be read at a fair range.

Congenital Deformity of Lids.

Dr. B. Chance showed a man of 60, the skin of whose eyelids is so relaxed that that of the upper lids droops so far as to cover the fissures, while that of the lower sags in great masses. The deformity, which has been present since birth, does not resemble blepharochalasis, nor does it partake of the properties of an inflammatory process, but seems, rather to be the effect of a lack of the elastic fibers of the skin.

C. S. O'Brien, Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

January 21, 1922.

Dr. F. R. Spencer Presiding.

Commotio Retinae.

W. C. Finnoff, Denver, presented a young man who seventy-two hours previously had received on the right side of the face a blow from a fist, immediately followed by marked swelling of lip and cheek and a subconjunc-

tival hemorrhage. Vision of the right eye became dim, and the patient remarked that objects looked purple and their centers punched out. The vision measured 0.06 eccentrically. When the patient was first seen, on January 20, a subconjunctival hemorrhage extended from the limbus to the outer canthus. The media were clear. The upper and lower temporal veins were slightly distended and tortuous. At the fovea was a cherry red spot, in the region of which the retina was slightly paler than normal over an area measuring 1/8 disc diameter. Outside of this pale area was a circular grayish area measuring about 3/4 disc diameter. The center of the disturbed area, outside of the fovea, was slightly elevated.

Discussion: Edward Jackson, Denver. To the temporal side from the macula I noticed a whiter line somewhat concentric with the disc which looked as tho it might approach the character of a rupture of the choroid.

Retinal Detachment.

W. C. Finnoff, Denver, presented a woman aged sixty-four years, who on December 24, 1921, had noticed that the vision of the left eye was poorer than that of the right. There was no pain or discomfort, and the history was negative as to injury. She had been treated by an optician until examination on December 31, when vision was R. 0.14, L. movements of the hand at twelve inches. The right fundus was negative except for slight kinking of the veins by the arteries. The right vision was normal with correction, the left unimproved. The upper part of the retina of the left eye was displaced forward sixteen to twenty diopters. Just below this area of detachment a part of the disc was visible. Just in front of the disc on the temporal side a thin mass of exudate obscured the vessels. The whole periphery of the retina was displaced forward, the temporal portion being very white and opaque and thrown into irregular folds, whereas on the nasal side the pink fundus reflex was visible thru the retina. The tension was normal, and transillumination, Wassermann, and urine tests were negative, as were the nasal sinuses and teeth. The systolic blood pressure was 150 mm. There had been no change since the original examination.

Steel in Posterior Ocular Wall.

W. A. Sedwick, Denver, presented a man aged thirty-two years who had come on account of blurred vision in the right eye and a sensation of scratching in the eye, of variable location. Two years previously, while he was picking down rock in a silver mine, something had blown into the eye. There had been an inflammatory reaction of four days duration, but the vision had recovered from the initial disturbance and he had continued work. A few weeks later the vision again failed, and the patient was bothered by streaks before the eye. The more recent disturbances had begun about one month ago. The vision was R. 6/100, L. (with correction) 15/20. The right iris was a good deal discolored, and showed a wound between seven and eight o'clock, corresponding to a very small corneal scar. The lens was cataractous. X-ray localization showed a small foreign body downward and to the nasal side near the optic disc, probably lodged in the coats of the eyeball. It was suggested that an attempt to remove the foreign body was not advisable, and that enucleation of the eyeball was not at present called for, but that the cataract should be extracted later.

Discussion: H. R. Stilwill, Denver, thought there was no object in trying to remove the piece of steel, the velocity having probably been reduced sufficiently by its passage thru the front of the eye to make it improbable that it would have retained sufficient momentum to enter the posterior coats.

W. C. Bane, Denver. Dr. Sedwick and I made a test with the sideroscope, but the result was not positive. The foreign body is by this time encysted. We do not know that it is magnetizable. I think it unwise to attempt removal of the fragment so long as the eye remains quiet. If the fragment is

encysted, you could not hope to get it out with the magnet, and would probably do a good deal of damage in the attempt.

C. E. WALKER, Denver, referred to a case in which the fragment had stayed in the sclera for about twenty years without damage to the eye; and thought that if the X-ray indicated that the splinter was in the sclera it would be well to leave it alone.

MELVILLE BLACK, Denver, favored leaving the eye alone until more marked symptoms developed. He did not believe there was danger of sympathetic inflammation occurring in the other eye without preceding attacks in the injured eye.

Traumatic Cataract From BB Shot.

W. C. and W. M. BANE, Denver, presented a youth aged eighteen years whose left eye had on January 2, 1922, been struck by a BB shot from an air gun. On that date vision was of hand movements. There was a slight abrasion of the cornea, and there were three mm. of blood in the lower angle of the anterior chamber. Next day the vision was 5/60—. On the third day most of the blood in the anterior chamber had been absorbed but there was a stellate figure in the posterior cortex. Now, nineteen days after the injury, the opacity had greatly cleared, and the fundus reflex was seen thru a web like opacity. The vision was 5/30 with plus 3.50 sphere. Atropin and dionin had been used locally.

Discussion: W. H. CRISP, Denver, thought the condition of the lens was likely to remain pretty much as it was.

Opaque Nerve Fibers.

F. R. SPENCER and C. L. LA RUE, Boulder, presented two striking cases of opaque nerve fibers, in women college students, aged nineteen years, each of whom had come on account of refractive strain. In the one case each eye presented an opacity extending in all directions, but irregularly, from the margin of the optic disc; while in the other the left eye only was affected, and the optic nerve fibers extended upward and downward from the disc margin.

Lacerated Injury From Gunpowder Explosion.

W. F. MATSON, Denver, presented a youth, aged nineteen years, who on July 2, 1919, had received an injury in the left eye caused by a blow from a baking powder can, which he had filled with gunpowder, touching it off with a fuse at a distance of fifteen feet. There had been a small corneal tear and iridodialysis below. The eye had quieted down under ordinary treatment, and so remained. The lens capsule had been ruptured, and the lens had been gradually absorbed, without hypertension. Was it advisable to open up the opaque lens capsule?

Discussion: Opinions were expressed in favor of leaving the eye alone.

Papillitis, Brain Tumor or Albuminuric Retinitis?

E. E. MCKEOWN, Denver, presented a man aged forty-one years who had come complaining of headache and double vision. Some time ago he had had influenza, from which he had not made a good recovery. In October, 1921, he had fallen eight feet from a loft to a board floor. After the fall he had been irrational for four hours. He had seemed all right after the injury, except that his neck got stiff and he a continual headache. About six weeks after the injury he developed an aphasia and some numbness in the right hand. He stated that about December 1 some drops had been put into his eye by an eye specialist, and that he had seen double ever since. Another physician had made a diagnosis of Bright's disease and uremia. Each fundus showed a choked disc of about three diopters, with a fairly pronounced congestion of the retina. There were five or six small hemorrhages, probably rather old, in the left eye, and one very small hemorrhage in the right. The vessels were not tortuous. There were no spots of exudate. A number of polypi had been removed from each side of the nose, and the ethmoids and sphenoids had been opened at the same time. Wassermann test was negative for the blood, mildly positive for the spinal fluid. An X-ray

examination of the skull was practically negative. The vision of each eye was 20/30, and the visual fields were normal. The patient had been given one dose of arsphenamin.

Discussion: Melville Black, Denver, thought that the diagnosis was more probably albuminuric retinitis than brain tumor.

Edward Jackson, Denver, thought that the history pointed to the presence of syphilis, and that the recent details suggested that the diagnosis lay between syphilis and injury to the optic foramen at the time of the fall. There was nothing typical of syphilis in the neuroretinitis, but taking the history and positive Wassermann he thought it was likely that injury had been complicated by the presence of syphilis.

W. C. Finnoff, Denver. I recently had a very puzzling case at the county hospital. There was a frank albuminuric neuroretinitis, with snowbanks around the macula, the nerve swollen, albumin and casts in the urine, but hemiplegia on the right side, with no other signs. The neurologist's diagnosis was uremic hemiplegia. A few days later the patient choked to death. At postmortem a large tumor was found on the right side of the brain. The kidneys were decidedly contracted, that is there was advanced kidney disease as well as a brain tumor.

F. R. Spencer, Boulder. It is quite possible that the albuminuric condition is due to the polyps. Keiper has reported a number of cases of this kind.

Wm. H. Crisp,
Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

Dr. Hilliard Wood, President.

January 16, 1922.

Specific Keratitis.

Dr. J. J. Frey exhibited Mrs. A. B. aet. 25, who first consulted him August, 1920 complaining of failing vision in each eye. Her family history was negative. Personal health had been good until 18 months previously, when she contracted lues. Examination showed vision P.L. each eye. Marked keratoiritis, with posterior synechiae each eye. Blood Wassermann plus 4. Family physician began administering salvarsan, giving one injection every two weeks until 12 doses had been given. Atropin solution instilled in each eye. No improvement in condition of either eye until Dr. Frey began subconjunctival injections (usually 10 minums) of 1/2% solution mercury cyanid combined with salt, September 15, 1920. These were given at intervals of three weeks until seven doses had been administered. The keratoiritis immediately began to subside. Vision at present: R.E. 20/100; L.E. 20/50. During the treatment a tonsillectomy was done on this patient. Feb. 19, 1921 patient resumed regular duties.

Discussion.—Dr. W. G. Kennon regards subconjunctival injection of cyanid of mercury, in these acute cases, as being of doubtful benefit, as it is the natural tendency of such cases to improve under antiluetic treatment. He has used it with rather indifferent results. He does not think it has any hastening effect upon the process of clearing up. He reported having used it on one eye in a case of double keratitis, and the case did clear up remarkably well. But the clearing up in the fellow eye was just as slow, and just as complete, as in the eye given the injection.

Dr. Eugene Orr questions the advisability of using such a strong solution of mercury cyanid, stating that the strongest solution he uses is 1/2 grain to one ounce. He asked whether novocain or dionin was added to the solution; also whether Dr. Frey did not have to keep the patient under morphia to control the pain.

Dr. E. B. Cayce said that he had been very much interested in the work of Dr. E. L. Jones, who has done so much to standardize subconjunctival injections, and whose experience bears out the statement of Dr. Kennon, i.e., that it is not so much the specific drug which accomplishes a beneficial result as it is the reaction of the tissues. Dr. Jones' formula is 1-2000 of cyanid of mercury and he advises that 2 cc. be in-

jected. Dr. Cayce believes that in such cases the iodides should be given in massive doses, and pushed to a point even beyond that which is ordinarily understood as iodism.

Dr. Robert Sullivan thought the absence of severe pain rather remarkable. He said that it was his custom to inject 2 cc. of the solution, 1-2000 with 1/4 grain morphia, dionin and novocain, and occasionally bicarbonat of soda; and even then it is almost impossible to quiet the patient without an additional hypodermic.

Dr. Hilliard Wood considered the striking feature about this keratitis to be that it followed acquired lues. While the condition is, of course, quite common in children with hereditary lues, yet he has seen only one case, possibly two at the outside, of interstitial keratitis following acquired lues in an adult. He was especially interested in the effect of the cyanid of mercury injected subconjunctivally in this type of cases, believing that theoretically the treatment is good, and certainly worthy of further study.

Chronic Choroiditis.

Dr. E. B. Cayce: Miss N. M. aet. 23 first consulted him January 12, 1921 with a history of influenza two years previously, followed by failing vision in the left eye. For the past two or three months has had pain in each eye, gradually growing worse. Examination showed R.E.V. = 20/15; L.E.V. = 20/200, not improved by glasses. Left eye: Large patch of choroiditis in region of macula; fresh hemorrhages towards disc margin. Right fundus beginning to show some new changes. Nasal septum deviated to the right, with spur on right side. Faucial tonsils enlarged and septic. Referred to Dr. J. P. Keller for general examination. Dr. Cayce advised tonsillectomy.

Discussion.—Dr. Herschel Esell stated that in his opinion the all important feature in this case is the visual result. He unhesitatingly advised tonsillectomy. His experience has been that following tonsillectomy the voice is as good, if not better, than before operation. Drs. M. M. Cullom, and E. L. Roberts expressed similar opinions.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

January 10th, 1922.

Uveitis, Vitreous Opacities.

Dr. J. A. Hughes, presented the case of Miss Thelma W. age 16, white, school girl.

Came to me January 9th, 1922, complaining of poor vision and some pain in right eye, with the following history: One week after having read for several hours, she noticed some pain in right eye, and that there seemed to be a scum or something in her eye, and she placed her hand over left eye and found she could not see very much with right eye. Has never had any trouble with her eyes before, and has never had them examined or worn glasses. Has had frequent attacks of tonsillitis, and all the diseases of childhood.

On examination I found the pupil of right eye slightly dilated; but it reacted to light fairly well, and was perfectly symmetric. Conjunctiva slightly inflamed, but no mucus or pus in the sac. Tension with McLean's tonometer 24. Vision O.D. 10/200, O.S. 20/70. Ophthalmoscopic examination revealed the media so dense you can hardly see the vessels; cannot outline the fundus at all. Some small vitreous opacities can be seen. The anterior chamber is very deep, and any amount of small dot like deposits upon the posterior surface of the cornea. Diagnosis, Punctate keratitis. Patient also has some hypertrophied tonsils.

Discussion.—Dr. J. B. Stanford thinks that all points of focal infection should be cleared up.

Dr. Hughes thinks that the tonsils should be removed in this case. He also asks about refraction to relieve eyestrain, and also how long should atropin be kept up.

Subhyaloid Hemorrhage.

Dr. Louis Levy presented Fred Bailey, age 41, occupation farmer. First seen July 15, 1921 in the medical clinic, complaining of having had a stroke of paralysis December, 1920.

Family history negative. Positive venereal history. Paralysis came on

while working. Had positive blood test at Hot Springs where he took some treatments.

Physical examination July 15, 1921, hypertrophied heart, accentuated second sound. Blood pressure, systolic 155, diastolic 80. Wassermann ordered. July 20, Wassermann was reported negative. The specific treatment was continued. Urine report showed positive albumin with negative microscopic examination.

From July 20th on to Nov. 2nd he continued to improve slowly, gradually getting better use of his muscles. On this date he complained that he had a skin over his right eye and was sent to the Ophthalmic clinic for examination. His chief complaint was the film and speck over right eye for past two days. Vision, O.D., 20/25; O.S. 20/25.

External examination negative except for prominent eyeballs. Ophthalmoscopic examination, right eye, media clear. Large disc shaped hemorrhage, one disc diameter above the disc, which seems to be anterior to the retinal vessels and has the appearance of a subhyaloid hemorrhage. Blood vessels tortuous. Veins dilated. Increased light streak in the arteries, crossing phenomena marked. There are a few small round hemorrhages in the periphery of the fundus on the nasal side. Left eye, the fundus picture similar to the right, except that there was no large hemorrhage. A Wassermann and urinalysis were ordered and the patient told to return for further study of the fundus. The next day the urine was reported negative and the Wassermann 4+.

The neurologic examination at this time revealed weakness of the entire right side of body, also hypertrophy of the heart; mitral, systolic and presystolic murmurs. The neurologist's opinion was that it was a cortical hemiplegia. Origin probably embolic from rheumatic endocardial origin, and not luetic. He thinks that the retinal hemorrhage is luetic.

Since that time he has been given two doses of arsenobenzol. On July 7th, the ophthalmoscopic examination showed the hemorrhage much smaller in size than it was on previous examination. It is now situated directly above the disc, in front of the retinal vessels, and conforms to the shape of the disc in outline below. Above, at the old site of the hemorrhage, are irregular spots, probably due to absorption.

Jan. 10th. The appearance is the same as on previous day.

Uveitis.

Dr. J. W. Ramsey presented the case of Mr. L. Y., age 27, school teacher, first seen on November 26, 1921, who gave the following history: Eight years ago the vision of the right eye became very much impaired. The vision cleared up except that, as he expressed it, there remained a spot which he could not see thru but could see around. On the first day he was seen by me, the vision was again impaired, this spot had become larger and the eye was very painful.

Examination showed vision O.D. shadows; O.S. 20/50. Ophthalmoscope showed the vitreous O.D. very cloudy and containing very large, black looking, floating opacities. The fundus could not be seen. There is a disseminated choroiditis in the left eye. The iris. O.D. was inflamed. Wassermann negative. Family history and personal history negative. Examination of nasal sinuses negative. Tonsils infected and were removed; with the local eye treatment of atropin, etc., the patient has had potassium iodid internally. But in spite of the treatment the eye has become worse, except for the relief of the pain, and there has developed the keratitis which is now seen.

Discussion.—Dr. E. C. Ellett says that the case is one of uveitis, and has become chronic and hopeless. The prognosis depends upon the location of the opacities in these cases.

Dr. Ramsey feels that the case is hopeless. He asks if injections of sterile milk will help. Dr. Ellett answered that sterile milk will help only in pyogenic infection.

Gunshot Wound of Both Eyes.

Dr. J. B. Blue reported E. H. while out hunting Dec. 27th, 1921 was shot in face with No. 7 bird shot. He was about 20 steps from gunner at the time. Admitted to hospital Jan. 3rd, 1922. At

this time condition as follows:

O.D.—Skin about eye ecchymotic, conjunctiva blood stained, pupil dilated (has been using atropin). Cornea and lens clear. No fundus reflex from lower portion of eye. Reflex above, but details not outlined. Vision, fingers at about 10 feet.

O.S. Lids much smaller, ecchymotic; conjunctiva chemotic and portion protruding between lids. Cornea clear; wound of entrance of shot in midline about 1 mm. above sclero-corneal margin. Iris protrusion. No fundus reflex. Eye movements very limited. There has been no pain at any time.

Discussion.—Dr. E. C. Ellett says that the outlook is bad where there is a perforation of the orbit. Treat with atropin and rest and if iridocyclitis does not subside, enucleate.

Dr. Stanford thinks that the left eye should be enucleated.

Optic Atrophy and Papillitis.

Dr. J. B. Blue presented H. G. who was struck on head Dec. 13. 1921. Admitted to hospital Dec. 21, 1921, eight days later. Examination at this time showed:—

O.D.—Lids smaller, ecchymotic; conjunctiva stained by blood pigment. Marked exophthalmus. Pupil moderately dilated, does not react directly to light. Reacts consenually. Media clear. Disc well outlined, pale. Small hemorrhages. No light perception.

O.S.—No exophthalmus, pupil moderately dilated, reacts to light. Media clear. Disc not able to be outlined, swollen. Numerous whitish spots about fundus. Vision fingers at 8 in.

Present Condition—O.D. Exophthalmus gone, no vision, disc white, vessels small.

O.S. Papilledema has diminished. Vision, fingers at 15 ft.

Discussion.—Dr. E. C. Ellett said that the eye grounds seem to show more of an albuminuric than traumatic appearance.

Glaucoma Operation.

Dr. J. B. Blue reported on H. W., on whose right eye an Elliot trephine operation for glaucoma had been done, and on whose left eye iridectomy.

O.D.—Operated upon last summer still has about as much vision now as before operation. Before operation vision was failing very fast. O.S.—Blind when admitted to hospital, operation done for relief of pain. This was successful for a while. Patient is now back for treatment on account of pain.

Double Chronic Glaucoma with Cataract.

Dr. A. C. Lewis presented Mrs. H. B. aged 69 who was sent from Mississippi on Dec. 30th, 1921 for cataract operation.

History: Has been practically blind in left eye for 14 years. Vision in right eye rapidly failing for a year. Dull pain has attended the loss of vision in each eye.

Examination: Corneas clear, pupils widely dilated, right lens very cloudy, left lens white and opaque.

Vision O.D.—counts fingers at 2 feet, in good light. O.S.—light perception only. Tension, O.D. 75, O.S. 90. McLean.

Dec. 31st—O.D.—Iridectomy done with the 3 cut method as employed by Reese.

O.S. Elliot trephine operation done.

Jan. 9th. Tension—O.D. 40, O.S. 15. (McLean).

Cataract extraction will be done on both eyes this week and a final report on the case made later.

Discussion.—Dr. J. B. Stanford could not elicit light perception in the right eye. The cataract operation is questionable.

Orbital Abscess.

Dr. G. H. Savage reported that on Nov. 30, 1921, Mr. M. F. H. age 37, was brought him for trouble of right eye. He gave a history of having had neuritis in neck, back and arms for past several years. This he attributes to a spondylitis due to being injured in a street car wreck. For about six weeks, previous to a week or two before coming, he had been in bed suffering from pain in back, neck and head. The history in regard to the eye is that three days before he had noticed the right eye was a little red and pained him just a little. Previous to this, he had never had any

trouble with his eyes. He said the eye ran water, the light was a little painful but there had been no pus. Had gotten no lick or injury of any kind to set up any trouble.

Examination of right eye showed vision 20/100. Very slight chemosis of conjunctiva at corneo-scleral junction. Slight redness of conjunctiva, lids swollen, pupils small and fixed. Tension, with fingers, normal. Very little pain in eye, but a great deal in top of head and in temples. Aqueous cloudy and could not make out fundus. Diagnosis at this first visit was iritis; treatment atropin and hot applications.

Dec. 1, 1921, eye worse. V. light and hand moving few inches away from eye. No change in external appearance. Pupil hardly semidilated. Continue atropin and hot applications.

Dec. 2, 1921. Eye much worse. Chemosis very marked with protrusion of conjunctiva at inner canthus. Slight exophthalmus. Vision light perception, complaint of intense pain in side and top of head, not so much in eye. Had been unable to sleep the previous night. Sent to Baptist Hospital with orders to have X-ray of sinuses and teeth made. The patient had never had any nasal or sinus trouble and the examination of nose was negative.

Dec. 3, 1921 Dr. E. C. Ellett saw him in consultation. He thought possibly some frontal sinus trouble was the cause of the patient's condition, which was about the same, except the exophthalmus was more pronounced, down and outward. The X-ray showed very slight if any involvement of frontal sinuses or ethmoids. Teeth negative as to abscess. Dr. Bethea who made X-ray examination thought the slight cloudiness of right frontal was probably due to the swelling in the lids and orbital tissues.

Dec. 4, 1921. Eye unchanged.

Dec. 5, 1921. Lids seemed to move more easily, otherwise eye the same.

Dec. 6, 1921. Seen again by Dr. Ellett who thought as I did, that an exploratory operation, at least, was justifiable. The symptoms, pain, exophthalmus and chemosis were more marked. Vision nil. Cornea dull and hazy, pupillary opening appeared slightly yellowish.

Dec. 7, 1921. Dr. Shea helping, opened the right frontal as tho going to do a radical operation, but found the sinus healthy. I then enucleated the eye. After making the circumcorneal incision thru the conjunctiva, I introduced a pair of curved scissors to free adhesions and on opening them a large quantity of thick pus was evacuated from upper and inner quadrant. The eyeball was opened during the operation and after its removal it appeared to be partially filled with pus. The incision in brow was closed and eye dressed. The patient was seen daily and eye dressed. Stitches removed on the 12th, patient doing well. Left hospital on 14th.

Dec. 16, 1921. Wound in brow opened and bloody pus evacuated.

Dec. 17, 1921. Wound closed, very little discharge.

Dec. 18, 1921. Lid wound closed, healed firmly without any more discharge, and patient went on to good recovery.

January 9th, 1922. Given an artificial eye, fairly good effect.

Discussion. — Dr. E. C. Ellett thought it peculiar that the patient had no fever. Another peculiar thing was the involvement of the orbital tissues and the eye at the same time.

Dr. W. L. Simpson asked about the source of the infection. He thought it possibly due to ethmoid involvement with a small perforation, occurring perhaps weeks previously.

Chronic Glaucoma.

Dr. Louis Levy presented W. W., age 45, who first presented himself with the following complaint: Cannot see out of right eye at all and only dimly out of left. Present trouble began six years ago, following a blow on the right eye with a stick while chopping timber. The vision gradually went out of the right eye, but the left was not involved at this time. Four years later the left began to give trouble and has been gradually getting worse. Says he sees best on the "outside part" of his eye. Vision, right eye, not even light perception; left eye 20/200.

External examination: Right eye, numerous anterior and posterior synechias. Lens absorbed except for a small piece of capsule in pupillary space. Left eye, pupil 3 mm. fixed. Complete posterior synechia. Lens clear.

Ophthalmic examination: Could not

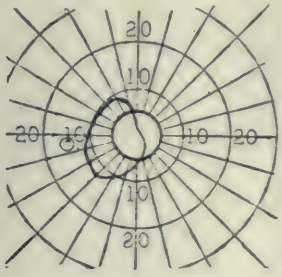

Fig. 1. Field of vision in glaucoma, Levy's case, before operation.

see fundus of either eye. Tension, right eye, too soft and would not record on instrument. Left eye, Schiötz 67. Field of vision shows marked contraction for form and color, leaving only a small

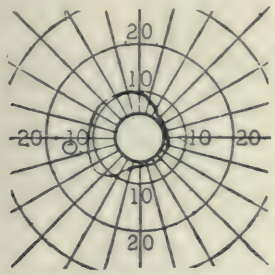

Fig. 2. Field after operation, left eye.

island of vision between 5 and 10 degrees. Immediate operation was advised.

Dec. 31, 1921. When seen at the hospital pupil had dilated somewhat and was about 5 mm., due to instillation of atropin. Operation: The conjunctival flap was made, a broad iridectomy performed and a sterile dressing applied.

Jan. 1, 1922. Dressing removed after 24 hours. Eye clean. Washed out with boric acid, one drop of 1% solution of atropin instilled. Dressing applied.

Jan. 2, 1922. Eye improving. Eye seems softer than before. Pupil well dilated from atropin. Eye washed with boric and dressing reapplied.

Jan. 4, 1922. Eserin sulphat, grs. 2 to 1 ounce of water three times a day in eye ordered.

Jan. 5, 1922. Conjunctival sutures removed. Patient discharged from the hospital.

Jan. 7, 1922. Tension, Schiötz 20. Eye very much improved. Discontinue eserin, continue heat and eye wash.

Jan. 9, 1922. Eye very much improved. Fundus of left eye can now be seen. It shows a deep cup, which involves almost the entire disc, except a very small part of periphery. Blood vessels well dilated. Vision with —2. sphere 20/100. Field of vision again taken and is about the same.

Jan. 10, 1922. Field of vision about the same as when first seen. With a —2.50 sphere ⌒ —0.25 cylinder axis 45°, patient sees 20/70.

Dr. S. S. Evans,
Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA, SECTION ON OPHTHALMOLOGY.

November 17, 1921.

Dr. G. Oram Ring, Chairman.

Avulsion of Optic Nerve.

Dr. B. F. Baer, Jr. exhibited a young man, who in May, 1914, was shot in the right temple with a bullet from a "32" calibre revolver. The bullet passed across the right orbit directly back of the right eye, thru the nares and the left orbit. Immediate blindness of both eyes, ptosis of the left upper lid and paralysis of the superior rectus muscle on the left side occurred. The blindness in the right eye has remained permanent. Five months after the injury, vision had so far improved in the left eye, that large objects were discernible, the patient stating at that time he could recognize individuals but was unable to read print. In the spring of 1919, he was struck in the left eye with a piece of wood, as a result of which a traumatic cataract developed. In the fall of 1919, a Tansley-Hunt operation was performed on the left up-

per lid with good effect, and at a later date, an attempt was made to remove the cataract.

Present condition. Right eye. Pupil widely dilated and nonreactive. A few fine vitreous opacities. At the posterior pole of the eye is a whitish area, irregularly round and about three times the normal disc in size. This area is completely ringed by a band of choroidal pigment. Superimposed in the center of the whitish area, is a mass of proliferating retinal tissue in which are a number of small adventitious vessels. The entire periphery of the fundus shows widespread disturbance of the choroidal pigment. The retinal veins are greatly contracted, and can be traced to the edge of the whitish area. The retinal arteries are absent.

The left eye presents a narrow, upward coloboma (operative) and the pupil space is filled with a thick secondary membrane, thru which no view of the fundus or fundus reflex is obtained. Vision in this eye is light perception in the temporal field only.

Discussion.—Dr. Wm. Zentmayer stated that he had exhibited the patient before the Section in 1919 with a diagnosis of avulsion of the optic nerve. The fundus of the right eye was little changed since then. The lesions present are largely those due to proliferative retinochoroiditis such as was frequently observed in France during the war. In the left eye an iridectomy has since been made with the hope of improving the vision which at the time of the operation was L. P. The patient now has form vision.

Exhibition of a Muscle Indicator.

Dr. Edwin B. Miller (by invitation) exhibited and described a device for the purpose of simplifying the study of the ocular muscles, and especially to visualize the exact position of the muscle in action in plotting the diplopia field and to pick out the faulty muscle in the search for the cause of the various forms of muscle imbalance. It is based on the classification of Duane. The indicator consists of two wooden tongue depressors nailed together to form the letter T, and several pieces of cardboard mounted on pins, to represent the midsection of an eye, and several to represent the true and false images, with two red arrows which point out the direction of the diplopia, the direction of the separation of the true and false image, the direction of the limitation of movement of the eyeball, and the location of the paralyzed muscle. On the central portion of the horizontal bar, there are four pieces of cardboard mounted on pins, two black, that represent the true and two red that represent the false image, in disturbance of the lateral turners. On the ends there are two larger cards on which there is a diagram showing the position of the true and false images in paralysis of the elevators or depressors. The patient is examined in a dark room. The operator, standing about ten feet in front with a candle or small electric lamp to elicit the diplopia, determines the position of the double images. The indicator is held face up, and the red arrow is turned in the direction of the false image, as shown on the horizontal arm. The examiner now reads off the various symptoms indicated and determines the affected muscle.

Discussion.—Dr. Luther C. Peter. As Dr. Miller has pointed out the indicator is an aid in checking up the correctness of the diagnosis as to which individual muscle or muscles are paralyzed. He has not included in the mechanical device all the data which this indicator will truthfully represent if the scheme is slightly modified, as he has omitted in his paper vicarious rotations of the head. The face rotations should be clearly and definitely separated from the tipping of the head to the right or left shoulder. The tipping of the head to the right or left shoulder is more in the correction of the obliquity of the false image than in the correction of the vertical diplopia. The face rotations are an effort on the part of the patient to bring the binocular vision in the field of least diplopia, or to place the eyes in such a position that the paralytic muscle operates but little, if any, and the diplopia may even disappear. Dr. Peter thought that the phrase generally used in tabulating ocular muscle palsies which states, "in the direction of the physiologic action of the paralyzed

muscle" or "opposite to the physiologic action of the muscle" should have added "with the eyes in the primary position."

Embolism of Central Retinal Artery.

Dr. Charles E. G. Shannon exhibited a male patient, giving the history of a sudden loss of sight in the right eye. Four days following the attack of sudden blindness, examination revealed loss of light perception, pupil moderately dilated and sluggish in reaction; disc hazy and pale, margins obscure, arteries contracted and a large ill defined whitish patch in the macular region, with a small hemorrhage to the temporal side. No cherry red spot.

Enlarged and diseased tonsils were found and removed. No evidence of cardiovascular disease. Wassermann, blood and spinal fluid negative; urinalysis negative; X-ray of teeth, sinuses and head negative; von Pirquet negative. Within four or five days, there was a slight restoration of vision, which reached 8/200 eccentric fixation. There was an absolute central scotoma which still persists.

Treatment consisted of iodides and deep massage. Endarteritis proliferans should be considered as a possible diagnosis, as no discoverable lesion was found. In view of the sudden and complete loss of vision, the pallor of the disc, contraction of the arteries, and opacity of the retina, a diagnosis of embolism appeared proper.

Obstruction of Central Artery of the Retina From an Unusual Cause.

Dr. George H. Cross reported the case of a man, aged 29, a watchmaker, who on arising April 24, 1921, discovered that the right eye was almost completely blind. Nothing unusual or out of the ordinary happened the day or week before this occurrence.

Examination: Ophthalmoscope, O.D. media clear, pupillary reaction very sluggish, disc margins obliterated, veins reduced in caliber, the larger arteries reduced to a thread; this condition prevailed thruout the fundus, which was anemic with marked paleness of the outer half. Macula stands out prominently as a cherry-red spot. In the lower center of the fundus is a large, irregular, pale, greenish-white area with a heavier border on the lower margin, quite typical of the condition described by de Schweinitz, quoting Coats' as ischemic necrosis. There were numerous tuft like hemorrhages in the central fundus, and there was noted on some of the arteries a marked periarteritis. Wassermann was negative to four antigens. A blood culture showed no growth; white blood count showed 12,000 leucocytes, polymorphonuclears —65%, lymphocyctes—31%, large mononuclears — 1%, eosinophiles — 3%. Urinalysis showed nothing unusual. Repeated examination revealed a gradually increasing cloudiness of the vitreous, until all details of the fundus were obscured. On the 5th month, 16th, a large area of punctate deposits in the lower third of the cornea were noted in conjunction with a thin ring like exudate on the posterior lens capsule.

June 15, 1921. Patient can now count fingers, cornea again clear, media permitting a view of the fundus; vision equals counting fingers peripherally. X-ray examination of the teeth showed no pus pockets, or areas of absorption. Sept. 27, 1921, vision in right eye 15/70—vision in the left eye which was unaffected = 15/15.

Causative Factor. For three months prior to the sudden loss of vision, this man had a bone felon on the right thumb, which persisted in discharging purulent material until a large sequestrum of dead bone was removed, this taking place after the ocular changes had developed. Inasmuch as the eye condition denoted an infective process and a physical examination revealed no other possible cause, it was decided that this obstruction of the central artery of the retina was in all probability due to a septic embolus.

Composite Astigmatic Chart.

Dr. Luther C. Peter exhibited an astigmatic chart which he had modified from that suggested by Dr. Walter B. Lancaster. The chart is made of standard wedding stock cardboard and a narrow black velvet baby ribbon, and has a diameter of 15 inches constructed on 15 degree intervals. Instead of pasting the ribbon on the cardboard, as suggested by Dr. Lancaster, it is passed thru small openings at both ends and fastened upon the back of the card. Here and there the lines are tacked to the cardboard by black

thread. As the patient finds difficulty in selecting only a few lines, which are almost equally black, the author, to reduce the number of lines to a minimum, constructs the chart so as to rotate. Lines above and below are marked on the rotating chart, and on the background at 7 1/2 degree intervals. If five lines, for example, are picked out, a rotation of the entire board 7 1/2 degrees to the right, or 7 1/2 degrees to the left, as the case may be, will enable the patient to reduce the number of black lines, in many instances, to two and three, and the exact axis of the astigmatism is more readily selected.

In a second chart Dr. Peter combines the "V-Chart" of Dr. Maddox, which consists of two lines of the same black velvet ribbon fastened to cardboard at right angles. To the end of one of these lines is attached a V, constructed of cardboard and ribbon, and placed upon a cardboard 3 1/2 inches in diameter. If the patient, for example, has selected on the first chart the lines 75, 90, 105, and 120 as the black lines, the second chart is put in place, with the V approximately within this area, from 75° to 120°. The patient very readily recognizes a difference in the shade of the two sides of the V, if the V has not been placed in the proper axis. The darker side is in the direction of the correct axis. The V is, therefore, rotated from one side to the other until both sides are equally black, when the axis is read off.

These charts were not presented to take the place of the usual examination with a cycloplegic which must necessarily be employed in practice. They were presented only as an aid to reduce the time of work and the many vexations which arise in difficult refractions.

Results of Cataract Operations Performed by Colonel Smith at Wills Hospital.

Dr. William Zentmayer read a paper published, (See v. 5, p. 97.), the table of results having been prepared by Dr. C. S. O'Brien, House Surgeon.

The discussion which followed the reading of Dr. Zentmayer's paper was participated in by Drs. de Schweinitz, Radcliffe, Schwenk, and Chance. The conclusion reached by each of these surgeons was that the operation for extraction of cataract by the Smith-Indian method, based upon the results in the group of cases operated upon by Col. Smith at Wills Hospital, was not to be recommended. It was recognized, however, that the trained assistants who constitute a most important adjunct of the Amritsar clinic, would have been a valuable aid in securing better operative results.

Color Vision.

Dr. Burton Chance read a paper on this subject published in full on p. 274.

Charles R. Heed, M.D., Clerk.

ROYAL SOCIETY OF MEDICINE, LONDON.

(Section on Ophthalmology.)

January 13th, 1922.

Dr. James Taylor, President.

The President felicitated Sir John Herbert Parsons on the honor of Knighthood, which the King had recently conferred on him, and in the name of the Section expressed the hope that Sir John would live long to enjoy it.

Sir John Parsons, in returning thanks, said the honor was a recognition of his having served on a number of Government Committees, on which, however, he served only as an ophthalmologist, therefore it was an honor to ophthalmology, and he was the fortunate peg on which it was hung.

Congenital Deformity of Conjunctiva.

Mr. Doyne showed a case with a congenital deformity of the conjunctiva, associated with deformities of tongue and thumb in the same patient.

Filamentary Keratitis.

Mr. Rea showed a case of filamentary keratitis, which lasted three years and had been very resistant to treatment. When bullae were removed, the patient came with a fresh crop in three weeks. Tension was normal, and there was no suggestion of glaucoma. The woman had suffered from arthritis for many years.

Hyaloid Vessels.

Mr. Humphrey Neame showed a case with branching remnants of per-

sistent hyaloid vessels. He thought it likely that these processes arose from one common trunk. Vision in the right eye, with correction was 6/36, in the left 6/9. There was also a thickening of the walls of some of the arteries in the right fundus; the strands had no connection with the lens capsule.

Miss Mann exhibited slides and drawings of embryonic eyes showing the earliest formation of a definite hyaloid artery. Until just before five weeks, she said, the globe was filled with mesoderm, in the meshes of which there were blood vessels, but definite branching arteries could not be traced much earlier than five weeks. There were usually five branches of the vessel, and they broke up again into blood spaces, which quite surrounded the lens. A 3-months embryo showed a differentiation of retina, with optic nerve. From the center of it came a definite hyaloid artery with thick walls. That broke up into five branches. She next showed an equatorial section .6 mm. in front of the disc; it showed a division into three main branches. In the next section, .1 mm. in front of the last, there was again a division into five. That went on to the sixth month, after which it began to disappear again.

Mr. M. S. Mayou referred to injected specimens of hyaloid artery in the embryo which he made some years ago. At the 4th month it could be seen that hyaloid did not break up at the back of the lens, as so many textbooks depicted, but far back in the vitreous. The posterior vascular capsule was formed by a cone of vessels up to the back of the lens. In some cases one branch was found persisting and anastomosing with the ciliary body. Sometimes there were masses of fibrous tissues at the back of the lens, which were supposed to be remnants of the hyaloid artery.

Mr. Leslie Paton suggested that Mr. Neame's case might be one of proliferating retinitis.

Mr. Neame replied that Mr. Paton's suggestion was a likely one; but the five branches seemed to come so locally from the back that this seemed to negative that idea.

Necrosis of Maxilla.

Mr. M. S. Mayou exhibited a baby with acute necrosis in the upper jaw. This was his third case of the kind, all under one year old. One had successive portions of the jaw removed until none remained; it was a spreading necrosis. It was an acute process in all the cases, and he believed the mouth could be excluded as a channel of infection in the present case; moreover, the disease occurred before teething, and before sinuses were present in the bone.

Mr. Leslie Patton mentioned a case of his own of the same character, a healthy breast fed child nearly four months old. When he first saw the child there was a large swelling under the left eye, and the eye was proptosed forward and outward to the extent of an inch. He evacuated about an ounce of pus from behind the eye. Bare bone was evident to the probe, but there had not been time for necrosis to take place. The condition seemed to belong to the same category as acute osteomyelitis in infants.

Mr. Stack enquired whether syphilis and tubercle could be excluded.

Mr. Paton replied that those diseases could be excluded in his own case; the only organism found in it was staphylococcus.

Mr. Mayou, in his reply, said both parents in one of the cases proved negative to Wassermann; in another the doctor was so sure there was no suspicion of syphilis that the test was not applied. The cases were, he thought, too acute for tubercle to be the cause; one had a temperature of 103°, and a pulse of 130.

Operating Lamp.

Mr. Lang showed an operating lamp; it could be attached to the ordinary bracket and carry a 1/2-watt lamp, with the necessary resistance. It enabled fluorescein staining, such as in corneal ulcer, to be well seen.

Trephine Operation for Glaucoma.

Mr. Malcolm L. Hepburn read a paper entitled "Experience Gained from 140 Trephine Operations for Glaucoma."

He regarded glaucoma as such a serious condition, especially the chron-

ic type, with its variety of symptoms and signs, that the question of operative interference merited all possible discussion. Recently contributions had appeared favoring iris inclusion and silk inclusion operations, somewhat to the detriment of the iris free operations. The reporting of late infections had deferred some surgeons from confidently recommending trephining, and had led some to give it up. In perforating wounds of the eye, and after cataract extractions, surgeons tried to avoid permanent inclusion of iris in the wound, because of the danger alleged to be associated with such inclusion, and he could not see the justification of it in operations for glaucoma, unless other methods had failed. The danger of leaving an opening in the eye separated from the external air by only a thin layer of conjunctiva was admitted, but it applied to all filtering scars, and the only question was as to which was the least dangerous.

In the 140 trephine operations he had performed in the last nine years, 27 were in private patients; and if the combined hospital experience of his colleagues could be studied, he thought there would be overwhelming evidence in favor of the trephine operation. At Moorfields, at least, late infection was very rare, and he believed its occurrence in a general way had been much exaggerated. He had not been without complications in his cases.

With regard to the technic he followed, the importance of an efficient conjunctival flap was very great in striving to avoid late infection; he made the flap as thick as possible, and he did his best to prevent tearing or button-holing of the conjunctiva, stripping the conjunctiva off the globe in its whole thickness down to the sclera from the beginning, and continued cutting with the scissors, the points of which were kept directed towards the globe. Toothed forceps he used only for the initial fixation; those subsequently employed were very fine toothless ones. On reaching the limbus he used the secondary cataract knife, keeping it directed towards the globe and pressing slightly. He never found that he got too far forward, as he always found himself further back at the end of the operation than he expected to be. Before commencing rotatory movements, he drew the flap upward and backward so that it was parallel to the trephine, so avoiding button-holing. While rotating the trephine, he directed the handle forward so as to cut thru the anterior part of the scleral disc before the posterior to ensure the formation of a hinge posteriorly when the section was complete; then the disc could be removed later without fear of injuring the conjunctival flap. Having once got the trephine to bite, he did not remove it until the section was finished, so that the full force of the aqueous discharge would push the knuckle of iris well out of the wound. The guide to the penetration of the sclera was the coming up of the pupil toward the hole. When the iris presented, it must be dealt with at once; the disc could be left to take care of itself. He grasped the iris with very fine straight forceps, at the same time pulling downward and forward, so as to detach it from its root. Lastly, he cut off the disc, which could be done easily without endangering the conjunctiva. Usually he inserted one or two stitches in the conjunctival flap; perhaps there should be more.

Proceeding to the consideration of complications, Mr. Hepburn said that if a hole was seen in the flap, a new point of application of the trephine must be selected. Three or four times loss of the disc had happened to him; it might be drawn into the anterior chamber, it might be left in the trephine, or it might be washed away when the aqueous was discharged. Sometimes the iris was so dilated at the time of operation, that the force of the aqueous discharge caused a total prolapse to the pupillary border; in this case all the prolapsed part must be cut off and a complete iridectomy performed. On occasion a complete iridectomy occurred from a too free division. If a complete iridectomy was intentionally done, the iris must be pulled well out of the wound. Apart from cases of buphthalmos—in which the accident was not uncommon—he had had vitreous loss only three or four times. Whether it influenced the subsequent draining capacity depended somewhat

on whether the vitreous was solid or liquid. In two of his cases there was good drainage and no affection of vision afterward; in one case the vision had remained at 6/6.

With regard to delay in the reformation of the anterior chamber, this had occurred in about six of his series of cases. He now allowed these patients to be out of bed at the usual time after the operation, when he usually found that the anterior chamber formed immediately. When this formation was delayed unduly, he was anxious lest there might be adhesion of the iris to the trephine hole; for this reason he always used atropin as a routine treatment. In two or three of his cases the lens had come forward, but only in one case was he able to assure himself that there were no opacities previously. He was not aware of detachment of choroid having happened often in his cases, but it might occur without being recognized. He had not encountered serious complications from this cause, tho it might account for failure in the reformation of the anterior chamber.

What cases were to be included in the term "late infection?" As the permanent opening in the eyeball was the weak point in the operation, the entry of organisms thru this channel must be established to justify the use of the phrase; he thought inflammatory reaction must be associated with rupture of the conjunctival flap. Inflammations occurring many years after operation, when there was a thick and firmly attached flap, could not be included as late infections. And he did not see why every type of inflammation occurring in an eye after trephining should be directly ascribed to the operation.

A general review of his cases showed that by far the best results ensued in cases which he secured early, and especially if he had been able to do the operation at a time when the tension of the eye was normal. In acute glaucoma he trephined only if he had been able to reduce the tension before operating. If he could not reduce it, his practice now was to perform iridectomy. He had seen two eyes in the same patient in which one had been trephined in an early stage, but in which operation on the other eye had to be postponed, and the unoperated eye steadily went downhill with the same symptoms; but, after operation these symptoms were cut short and controlled. That his private cases had been more successful than the hospital ones he attributed to the fact that private patients were more observant and anxious about initial symptoms, and early sought advice. His 13 failures in the 140 had been in cases whose tension at the time of operation was raised, where there was a long history of the trouble, and in which the field had been contracted in a general way, almost to the fixation point. As failures he reckoned those cases in which sight was restricted to finger counting, with much contraction of the visual field, and where no improvement followed the operation. Many cases appeared to have worse vision immediately after the operation but it improved later. He seldom had good results in acute or in secondary glaucoma; both these kinds showed too much congestion round the limbus, and this encouraged healing of the trephine hole. Moreover, in acute glaucoma the conjunctiva was often very friable. He had had two cases of cyclitis; both recovered. He had had no case of sympathetic trouble following trephining.

As a result of his experience, he had formed the opinion that the operation of trephining, performed with every consideration for the conjunctival flap, was the ideal one for chronic glaucoma, especially for the type generally met with in young adults.

Mr. R. R. Cruise said all surgeons naturally preferred the type of operation which, in their hands had been successful. He had now ceased to do trephining for glaucoma, tho at one stage in his practice he trephined all his cases of that nature. He abandoned the operation because of one or two disasters, and since he had changed his operation those had not happened. In two there was an escape of vitreous; he did not know why; not, he thought, thru any fault in technic. At the operation on one of them a colleague was present and praised the operation, foretelling a good result. He called in colleagues in consultation.

The eye remained quiet, but vitreous continued to come out. He cautiously sealed up the hole, and the tension rose to plus 3 or 4, and the lens was drawn up. It was the patient's only eye, and he went blind. In two cases there was infection afterward, causing conjunctivitis; these patients were left with vitreous opacities. He had also had, when doing trephining, a good deal of subconjunctival thickening around the trephine hole margins. For ten years he had been doing a modified flap sclerotomy, doing rather more than Herbert did, i. e., completing the two sides of the flap well forward into the cornea, and beyond the rim of resistance felt when cutting thru. It was very important not to suture the conjunctiva. One of the features of trephining which made him more dubious about it was the transparent pedicle which remained, enabling one to look into the depths of the eye.

Mr. M. S. Mayou agreed as to the transparent bubble which was left after trephining, and it was a spot very difficult to cover and protect. A further objection was, that the cornea had to be split in order to get the trephine on properly. During the last three months the speaker had been carrying out the new operation of Holt, who claimed it did not leave a transparent bubble, and that was true in the cases in which Mr. Mayou had so far done it. He described Professor Harden's method of ascertaining detachment of the choroid. The examination, done as early as the second or third day, was carried out by means of the contact illuminator. This was put on the globe 5 or 6 mm. behind the sclera, and if there was a detachment of choroid, the whole area of sclera right to the cornea would be illuminated; but if the choroid was in its place, there would be illuminated only an area around the point of contact.

Mr. Lang thought the danger arising from the hole in the flap had been much exaggerated. The amount of drainage was directly proportional to the diameter of the trephine hole. The operation he did for glaucoma was a modified Lagrange, turning back a piece of conjunctival flap and taking away a part of the cornea.

Mr. Hepburn, in the course of his reply, considered that Mr. Cruise had had bad luck in his cases, which caused him to adopt a different procedure. He, the speaker, did not find transparent blebs were common, and when they did occur they got thicker with the passage of time. He had never found that splitting of the cornea made any difference. The Lagrange operation was, in his opinion, merely a glorified trephine operation. Tho patients who had a hole in the conjunctiva might survive trouble or escape it, it was not wise to design a procedure on that assumption.

Epibulbar Sarcoma; Penetration of Globe.

Mr. Humphrey Neame read a paper on this subject, illustrated by a number of microphotographs, projected by the epidiascope. In May, 1919, the patient noticed a swelling under the upper lid of the left eye. There was a history of syphilis, of recent ulceration of the palate and deformity of the nasal bones, and the Wassermann reaction was positive. For some time the swelling was regarded as a gummatous infiltration, but as it did not react to antisyphilitic treatment, and the eye was practically blind, Sir John Herbert Parsons, under whose care the patient was, decided to enucleate the eye. Pathologic examination revealed an extensive epibulbar growth, with extension within the globe. The growth surrounded the cornea and, as a thin sheet, spread around the eye to the posterior pole. The iris, ciliary body and choroid were completely infiltrated with the same type of growth. It was a round celled sarcoma, with slightly alveolar formation. Within three months of the enucleation, there was a recurrence within the orbit, and Sir John Parsons carried out exenteration of the orbit. There was a mass of round celled recurrent growth not definitely delimited from the orbital tissues. The stump of the optic nerve, in transverse section at the posterior limit, was free from growth cells. An extension of extrabulbar sarcoma within the globe was an extremely rare condition. Less rarely, sarcoma started in the choroid, and extended out thru the coats of the eye, usually by the perivascular lymphatics of the various perforating vessels. Mr.

Neame thought there was more evidence that this growth was of extrabulbar origin than that it was at first intrabulbar. The reasons he adduced were:

(1) The earliest symptoms were referred to the epibulbar region above the cornea. (2) The vision in the eye, within two months of the commencement of symptoms, was 6/6 with the appropriate glass; no visual failure in it was noted until 7 months after the onset. An extensive choroidal growth usually effected the vision. (3) The growth was much more massive at the point first noticed than elsewhere. (4) The gross appearance of the choroidal growth resembled a secondary or metastatic growth more than a primary growth there. (5) The alternative, flat sarcoma of choroid, was usually densely pigmented, whereas this was a nonpigmented growth. (6) Flat sarcoma was almost always relatively avascular, whereas thruout the present growth there were many delicate capillaries. (7) Flat sarcoma often invaded the deeper layers of the sclerotic, but this growth had only slightly done so, but had definitely invaded the superficial layers of this structure in various parts. He concluded with some extracts from literature bearing on the subject.

Sir John Parsons referred to the close mimicry of this condition, in its earlier stages, of gummatous infiltration of the conjunctiva and sclera, especially when, as in this case, the reaction to Wassermann was positive. Only slowly, after a long course of antisyphilitic treatment had been given, was it realized to be a new growth. Concerning epibulbar growths in general, on reading cases of the kind he could not quite convince himself that there had not been some small lesion in the eye, which had subsequently extended outward. Even in Mr. Neame's case there was that possibility, tho the author of the paper had adduced much evidence favoring the opposite possibility.

Mr. Mayou threw out the suggestion that a flat sarcoma might have existed in the anterior part of the globe and then perforated, good vision nevertheless persisting. In flat sarcoma the retina remained attached for a long time. One of his patients had detachment in the anterior part of the globe, and vision was still 6/13 when the eye was removed. The growth had infiltrated the canals along the vortex of veins and lymphatics. The patient died two years later of recurrence. He suggested that this case should be submitted to a Pathologic Committee, to place it on a sure basis. This was agreed to.

Mr. E. Treacher Collins pointed out that there could be no doubt as to the direction of spread in the case of epithelioma, as that type of growth never started in the eye; however, much doubt might be thrown on the manner of spread of epibulbar sarcoma. He referred to a paper he read some years ago before the Ophthalmological Society on epibulbar epithelioma. He showed then illustrations of epithelioma spreading along the vessels at the limbus into the canal of Schlemm, and he had read of other cases which behaved similarly. A further point favoring Mr. Neame's view was the way the growth spread on the outer surface of the sclerotic. If a piece for diagnosis had been removed in this case earlier, removal of the eyeball might have been obviated, and the case rendered more hopeful. He referred to a case of his own in which he cut off the top of the growth and sent the patient to be further treated at the Radium Institute, and after two or three applications of that salt, the growth entirely disappeared and he knew of no recurrence of it.

Mr. J. H. Fisher agreed that a piece should have been removed earlier, and referred to a case of his own of similar nature in which subsequent application of the actual cautery prevented any recurrence.

Mr. Leslie Paton also alluded to an interesting case, in which the application of radium for 24 hours after the operation kept the man free for a long time, and a swelling of the soft palate, probably of the same nature, which developed was similarly treated with radium and also disappeared.

H. Dickinson.

SPECIAL REPORT

INDUSTRIAL INSURANCE AND INDEMNITY RULES FOR THE EYE, OF THE GOVERNMENTS OF THE UNITED STATES, GREAT BRITAIN, FRANCE, ITALY, BELGIUM, AND GERMANY.

HARRY VANDERBILT WÜRDEMANN, M.D., F. A. C. S.,

This is from a report made to the Pacific Coast Oto-Ophthalmological Society. The portions referring to the eye are here included. The full report, also referring to the ear, nose, throat and face, is published in the Transactions of the Society.

GENERAL GOVERNMENT SERIES, UNITED STATES OF AMERICA.

To guide the Medical Officer in rating eye cases (particularly for refractive errors) the opinion must conform to the opinion of the General Counsel issued regarding eye cases causing less than ten per cent disability, viz.,

(a) No treatment or corrective appliances (glasses) can be provided unless the disability is ten per cent and is shown to be connected with service.

(b) If the disability is due to those defects of form, shape, and structure of the eye which are known to be of congenital origin, such as astigmatism (except traumatic) and hypermetropia and myopia, even if not noted as existing prior to service, it will not be considered as of service origin and will not justify treatment or compensation, even if thought to cause disability of ten per cent or more.

(c) The supplying of glasses for correction of refractive errors during service, unless there is specific evidence showing that the character of duties performed during service were such as to have certainly caused or aggravated such errors of refraction, shall not be construed as evidence of service origin of refractive errors known to be due to congenital errors of structure, form, or shape of the eye.

(d) Provision of glasses shall not be authorized in any case by temporary partial rating of ten per cent, or more, for a limited period, or by other use of rating unless the conditions under (a) are shown to prevail.

(e) When a rating of ten per cent or more is given a disease or disability, other than a defect of refraction, in the treatment, relief, or care of which the correction of the refractive error is considered to contribute an important or essential element, the rating will be concurred in even if the refractive error is rated at less than ten per cent, and the claimant will be ruled eligible to receive such correction of refraction as will materially contribute to the cure, arrest, or maximum improvement of the condition for which the rating of ten per cent or more is made.

For the correct application of the War Risk Insurance Act, in cases in which the claim for treatment or compensation is based on the presence of refractive errors, the following is for information as a guide in the making of ratings.

There will doubtless appear for some time, but in a continually diminishing number, patients for whom authority has been given on a temporary partial rating of ten per cent for a limited period, for the purpose of permitting them to obtain glasses. This, we are advised by the General Counsel, is not permissible under the Act and will be discontinued.

Without authority based on service connection and ten per cent or more disability for refractive error, you may not authorize the supply of glasses, except under such conditions of emergency as may arise in each case. Loss of glasses, need of change of glasses, several months after discharge, etc., are not considered an emergency within the meaning of the law. When patients are hospitalized, or are being treated for compensable defects as out patients at the various hospitals or dispensaries, the treatment of refractive errors may be supplied, if it is considered by the attending physician or surgeon in

charge, to be a proper part or adjunct to the treatment of the conditions for which the claimant is under treatment as a compensable defect due to service.

It must be left to the discretion of those immediately in charge of the sick patient to determine whether correction of a congenital refractive error is necessary or properly contributory to the treatment of the condition for which authority has been given for hospital or other care.

In the future, this Bureau will not authorize provision of glasses except as specified in the above memorandum. This applies to our procedure from this date forward and does not affect authorization already issued, which must be honored.

Abbreviations used—
T.P.—Temporary partial
P.P.—Permanent partial
P.T.—Permanent total.

(1) The ratings for refractive errors, as herein stated, are in all cases where visual acuity has been corrected with proper lenses. If due entirely to refractive errors, no rating should be awarded for any defect in visual acuity. Progressive high myopia with degenerative changes in the eye should be considered a disease, and so rated.

(2) For the purpose of rating visual disabilities due to corrected refractive error, 20/40 vision (Snellen) in each eye shall be considered the minimum of normal visions, and vision of less than 10/200 in an eye will be considered as equivalent to total loss of vision in that eye. If due to an injury or disease originating during service, no rating should be awarded for any defect in visual acuity which is 10/20 or better in each eye, or can be corrected by glasses up to 10/20 or better in each eye.

(3) In determining whether the defect in the visual acuity is due in any way to an injury or disease originating during the service, the history of the case and the result of a competent ophthalmologic examination should be carefully considered, and the Specialist's report confirmed by a Consultant Eye Specialist.

(4) If recorded on enlistment, or having history of injury preexisting to enlistment, the following conditions may be considered as "Obviously apparent" on enlistment—External injuries or scars; organic disease in the interior of the eye, such as choroiditis, optic atrophy or possible lens changes.

(5) Functional loss of vision should be rated as less than ten per cent whether in one or both eyes.

In functional visual defects it is necessary to take into account—

(a) Visual acuity
(b) Field of vision
(c) Binocular vision.

Errors of color and light sense, notwithstanding their rarity, are symptoms of lesions of the nervous system and should be taken into account in conference with the Neuropsychiatric Section in the estimation of the disability due to these lesions.

Color blindness of congenital origin is not to be considered of service origin.

To the above table of ratings, a certain percentage shall be added for special conditions enumerated as follows:

(a) Obliteration of direct vision (such as from corneal opacity, deformed pupils, central choroiditis, lenticular opacity and retinal detachment).

For one Eye Add 10% P.P.
For both Eyes Add 20% P.P.

(b) Extraction of lens:

For one Eye Add 15% P.P.
For both Eyes Add 30% P.P.

In rating for extraction of lens either unilateral or bilateral the combined vis-

SCHEDULE OF PERMANENT RATINGS FOR PROPERLY CORRECTED REFRACTIVE ERRORS IN VISION. ONE EYE.

Other Eye—	Of or less than 10/200	10/200	20/200	20/100	20/70	20/50	20/40
Of or less than 10/200	100%	90%	80%	70%	60%	40%	30%
10/200	90%	80%	70%	50%	45%	30%	25%
20/200	80%	70%	50%	40%	35%	25%	15%
20/100	70%	50%	40%	30%	25%	20%	10%
20/70	60%	45%	35%	25%	20%	15%	7%
20/50	40%	30%	25%	20%	15%	10%	5%
20/40	30%	25%	15%	10%	7%	5%	0%

ual acuity for correction should be taken into account.

Provided, that that part of the above percentages will not be added which will increase the total percentage to exceed 100%; that no percentage for more than one of the above conditions, will be added to the same case, and that no total percentages will be given for any of the above conditions which is in excess of that given for complete loss of sight in the affected eye.

It is necessary to establish a general rule:

(1) In each case where ocular functional troubles, without anatomic lesions of the eye or its adnexae, as evidenced by objective examination, can only be considered absolutely incurable when the central or peripheral vision is involved.

(2) It is also considered the same in all lesions as cataracts, retinal detachments, and ocular hemorrhages, in the stage of evolution.

BLINDNESS OR IRREMEDIABLE LOSS OF SIGHT.

In this category should be considered the absence or atrophy of the two globes, leucoma, cicatricial staphylomata occupying the greater part of the corneae, complete atrophy of the optic nerve, extensive cicatricial lesions of the chorioretina in the region of the posterior pole, and retinal detachment in the stage of evolution.

From a practical standpoint blindness can be considered to exist where the central visions of one eye equals 1/20 with a deficient visual field, the other being inferior to 1/20.....100%

In other words 10/200 in one eye, and less than 10/200 with deficient visual fields.....100%

It is necessary to distinguish cases of loss of vision without apparent lesions, from loss of vision accompanied by mutilation such as enucleation, atrophy of globe, and extensive staphylomas.

Lack of accommodation and convergence (according to Duane's table) .....T.P. 20%
Diplopia (uncorrectable) ...P.P. 30%
Loss of conjugate movement in both eyes or three movements in the seeing eye .....P.P. 50%
Permanent concentric contraction in field of vision in one eye to 10%, not subject to restoration by treatment .....P.P. 10%
Permanent concentric contraction in both fields to sixty per cent or loss of temporal halves. P.P. 75%
Loss of nasal halves in both fields .....P.P. 50%
Homonymous hemianopsia, lateral, superior or inferior..P.P. 40%
Concentric contraction of both fields to thirty per cent...P.P. 25%
Concentric contraction of both fields to ten per cent of normal with retention of normal central vision .....P.P. 50%
Scotomas rated on interference with visual acuity.
Color blindness .....P.P. 10%
Heterophoria to a degree sufficient to produce asthenopia .....P.P. 10%
Nyctalopia (in proportion to degree of light sense).....P.P. 20%

Retinitis Pigmentosa. Rate on contraction of visual field and visual acuity.

(1) *Eye Lids*:
Infectious processes and tumors .....See face.
Lagophthalmus .....P.P. 20%.
Ectropion — Uncomplicated —Remediable .....Less than 10%.
Entropion—Irremediable ..Less than 10% to 30% P.P.

Symblepharon—Complicated —Epiphora—Remediable..Rate on complications. T. P. 10%. T.T. if hospitalized.
—Irremediable .....P. P. 10% for one eye. P. P. 15% for both eyes.
Ptosis—
One eye .....P. P. 15%.
Two eyes .....P. P. 25%.

(2) *Eyeball*:
(a) Injuries, Infections and Inflammations (including Glaucoma, Keratitis, Iritis, Iridocyclitis, Uveitis, Scleritis, Panophthalmitis .....T. P. 10% to T. T. depending on clinical findings.
Sequelae—(Rate on visual and cosmetic defects) .....
(b) Tumors—
benign .....Rate on visual and cosmetic defects.
malignant .....P. P. 10% to P. T.
nystagmus .....Rate on visual defects.
(c) Enucleation of eye ball. P. P. 40%.

Traumatic Cataracts:

(a) Nonoperable. The rating to depend upon degree of visual acuity:

(b) Operable, or where the cataract is absorbed.

If the vision is below that of the nonaffected eye by reason of the impossibility of fusion of images, add 10% if the total disability will not be more than the loss of vision on one eye.

If the vision of the noncataractous eye is worse or absent, refer to the table of visual acuity, rating the aphakic eye according to the best optical correction.

Dislocation of the crystalline lens, intraocular hemorrhages, and detachment of the retina, causing different degrees of disability, will be rated according to the degree of vision.

In all conditions involving the optic nerve, the fields of vision must be recorded.

In conditions with diplopia, muscles involved must be specified.

Paralysis of muscles of only one eye .....P.P. 25%

Paralysis of muscles of one eye and one muscle in working eye .....P.P. 35%

Paralysis of muscles of both eyes, working eye 3 or more muscles .....P.P. 40% to 50%

Paralysis of all muscles of both, or of working eye.....100%

In all cases of total blindness, where the claimant is in constant need of a nurse or attendant, an additional rating of twenty per cent shall be had from the date of permanent and total blindness.

Complete loss of taste and smell .....P.P. 35%

Loss of taste .....P.P. 25%

Loss of smell .....P.P. 15%

Note: In all border line cases a conference should be held with the Section within whose jurisdiction the disability is handled, and a combined rating arrived at to cover the disability.

MUTILATING WOUNDS, SCARS AND SUBSEQUENT DISFIGUREMENT AND PLASTIC OPERATION.

The precise disability resulting from the destruction of the important special organs, interfering with the motor or sensory functions will be accurately observed and rated. The position and extent of scars will be noted as well as any symptoms which they produce.

In all cases where disfigurement is noted, an unretouched photograph, passport size, should be requested. All plastic operations with the after results should be carefully considered, and the case rated accordingly.

Luetic and tubercular infections are not to be rated by the Eye, Ear, Nose and Throat Medical Referees, but shall be referred to the General Medicine and Tuberculosis Sections for a rating.

GREAT BRITAIN.

Cases of industrial disease for which compensation was paid. These figures are compiled from returns from (a) insurance companies which handle this type of business and (b) employers who insure privately.

(A) Cases continued from previous years. (B) Cases in which first compensation was paid during year.

		1910	1918	1919
Nystagmus	A	662	2550	3731
	B	956	1780	2718
Cataract in glass workers.	A	1	..	..
	B	2	..	1
Ulceration of cornea	A	..	2	..
	B	..	20	1

Accidents reported under the Factory and Workshop Acts to Certifying Factory Surgeons:

Loss of sight of one or both eyes.

	1910	1911	1912	1913	1914
Adults (over 18)—					
Males	49	48	48	79	48
Females	7	8	6	4	2
Persons under 18—					
Males	6	6	7	15	7
Females	1	1	..	7	2
Total	63	63	61	105	59
Accidents resulting in other eye injuries—					
Total	2044	2221	2277	2518	2444

FRANCE.

Extract from schedule of ratings for disability established by the decree of May 29, 1919, for application to your law of March 31, 1919, for war injuries.

It is necessary to establish general schedules:

1. In each case of functional ocular affections without anatomic lesions of the eye and its adnexae appreciable by objective examination, which is not to be considered absolutely incurable, which affect the central or peripheral vision.

2. It is the same with such lesions as cataract, detachment of the retina, ocular hemorrhage, etc., which may proceed.

3. In functional visual affections it is necessary to extend:

(a) the central vision (visual acuity);

(b) the peripheral vision (visual field);

(c) the binocular vision.

The affections of the chromatic and lid senses, which are very rare, are symptoms of lesions of the sensory nerve apparatus. They are to be considered with the other lesions.

I. Blindness or irremedial loss of vision.

In this category and cause: absence or atrophy of both globes, the leucomas and cicatricial staphylomas occupying the greater part of the cornea, complete atrophy of the optic nerve, profound cicatricial lesions of the choroid and retina in the posterior pole, detachment of the retina in the latter stages.

Practically, there is considered as partial blindness all those defects which affect the sense of vision or the visual field a twentieth part.

Total loss of vision in one eye, the other not being affected.

Loss of vision of one eye without apparent deformity 25%
Ablation or atrophy of the globe with deformity met by permanent prothesis 30%
With cicatricial lesions not permitting the use of an artificial eye 40%

Central vision. Reduction or loss of the visual acuity in the two eyes. The visual acuity is not estimated which takes count of optic correction by spheres, cylinders or spherocylinders. All the procedures usually employed to determine simulation or exaggeration are to be used in the functional examination.

In most of the former schedules the absolute disability for the blind was considered 125% and the tables were made in proportion.

Concentric contraction of the visual field.

To 30°, one eye .....0 p. 100
Two eyes .....20% —
Less than 10%, one eye....10% —
Two eyes .....70 to 80% —
Large central scotoma, one eye .....15 to 25% —
Two eyes .....70 to 100% —

Hemianopsia, implying loss of symmetric vision in two portions of the visual fields of either eye, with conservation of the central vision.

Homonymous, right or left..25 p. 100
Heteronymous nasal exceptions .....10% —
Heteronymous temporal exceptions .....40% —
Superior .....10% —
Inferior .....50% —
Hemianopsia in quadrant....10% —

Cases of hemianopsia which affect both horizontal and vertical or three quadrants of the visual field are obscure. Hemianopsia with loss of central vision of one side or both, refer to the table above, the total amount not to be more than 100%.

BINOCULAR VISION.

The function of equilibration which permits the two eyes to fix on the same object is equal on both sides. The diplopia is produced by paralysis of the excentric ocular muscles involving one or several.

Diplopia making it necessary to cover one eye 25%

Other Ocular Affections.

Ophthalmoplegia, internal unilateral ..... 5 to 10%
Bilateral .....10 to 20%

TRAUMATIC CATARACTS.

(a) Nonoperable (Amount depending upon the extent of visual acuity); (b) Eye operated or having the cataract resorbed.

If the vision is inferior to the eye which is not wounded, on account of

Visual acuity—	To 5/10	4/10 or 3/10	2/10	1/10	1/15 to 1/20	Less than 1/20 to 0	Apparent deformities with or without prothesis
1 to 5/10	0	5	10	15	20	25	30 to 40
4/10 to 3/10	5	10 to 15	15 to 20	25 to 30	30 to 35	40 to 45	45 to 50
2/10	10	15 to 20	45	50	55 to 60	60 to 70	75 to 80
1/10	15	25 to 30	50	65	70 to 80	85	90 to 95
1/15 to 1/20	20	30 to 35	55 to 60	70 to 80	85 to 90	90 to 95	100
Deformities with or without prothesis	..	45 to 50	75 to 80	90 to 95	100	100	100

NOTE:—The percentages are established from 10 to 100%. 100% is considered total disability.

the impossibility of making fusion of the images, allow 10% in the extent of 25% when the vision of the eye is lost.

Example:

V. O. D. (healthy)—1
V. O. G. (operated)—1 to 5/10 +10 D..... 10%
V. O. D (healthy)—1
V. O. G. (operated)—1/10 below + 10 D 25%

If the vision of the noncataractous eye is worse or absent, give optical correction of the aphakic eye. The luxation of the crystalline lens, intraocular hemorrhage, detachment of the retina are susceptible of modification, and, therefore, should be estimated upon the degree of vision.

OCULAR ADNEXAE.

(a) Bony orbit.

Destruction of one part of the orbit and its contents comprising the eye, severe lesions of the preorbital sinus and the nasal fossa, mutilation requiring restoration or prothesis .....50 to 70%
Paralysis of one or several muscles (diplopia) 25%
Vascular alterations (aneurisms, pulsating tumor of the orbit) following functional trouble .....20 to 60%

(b) Lids.

Most of the lid affections are curable by operations.

Destruction of the lids (entropion, trichiasis, ectropion, vicious cicatrices, symblepharon and ankyloblepharon) are to be corrected and adjudged according to the diminution of the visual acuity .....0 to 10%

Ptosis, curable by operation, otherwise to be judged on whether or not the pupil can be uncovered, depending upon the percent:

One eye	10 to 20%
Two eyes	40 to 70%
Lagophthalmos with facial paralysis:	
One eye, depending upon complications	10 to 20%
Two eyes, depending upon complications	30 to 50%
(c) Lacrimal passages.	
Epiphora	0 to 10%
Fistula with lesions of the bones:	
Unilateral	20%
Bilateral	40%

ITALY.

First National Congress of Eye Injuries.

The conclusions of the commission can be grouped as follows:

1. At first the commission has recognized the necessity of limiting the tables to cases of diminution of the acuteness of vision, i.e., those injuries that represent by themselves only the major part of the damage to the working visual capacity. It is understood that the anatomic, functional, collateral alterations, closely limited to the reduction of the acuteness of vision, are included in the valuation of these reductions.

Those approved are, therefore, basal valuations that could undergo amendments. Functional alterations of importance influence the diminution of the acuteness of vision, inducing larger reductions of the faculty of vision. Reduction of the visual field it is not necessary to hold important, as increasing the valuation of the reduction of the acuteness of vision, as these are based on a valuation of 35% for the loss of an eye, which includes also the valuation of the damage determined from the corresponding reduction of the visual field, so that counting their increase in the per cent for such reductions would cause it to be counted twice in determining the amount of damage of the capacity of vision as regards the amount of effective work.

2. To the theme of the damage determined from the reductions from the capacity of vision in one eye, or the damage resulting from the reduction of the capacity of vision already below the average, are contemplated in conditions preexisting that are additional causes of incapacity. In fact the valuations that follow regard simply the cases in which subjects prove a single accident, and are based on the functional alterations hereinafter indicated.

3. The commission has also held that, it being the intention to formulate a table to apply in the present legislative regime in which no account is held as to the occupation of the injured one, in determining his damage, by referring the ocular damage to a single valuation of 35%, for the anatomic or functional loss of an eye; it would not be proper to follow the tendency for a valuation differentiated from the vari-

ous damages in the various types of work, a tendency that the Congress did not accept in the discussion of this subject.

4. The commission has adopted the following subdivisions of injuries, as proposed by Valenti, distinguishing four conditions.

I. Lesions reducing the vision in one eye only.

II. Lesions reducing equally the vision of both eyes.

III. Lesions reducing in unequal proportions the vision of both eyes.

IV. Lesions that abolish the capacity of vision in one eye and reduce in various amounts the vision of the other.

5. The reduction of vision in one eye only.

(a) Vision of 6/10 is considered as the minimum damage to the working capacity as by a loss, i.e., of 5%.

(b) Vision of 1/20 is considered as the minimum that allows a capacity for working vision; vision of one eye inferior to this is considered equal to blindness and is, therefore, valued as an incapacity of 35%.

(c) Intermediate vision, between these amounts, of one alone should be valued progressively in a certain decimal percent of the vision; in the higher vision that which would correspond with the per cent of incapacity; but less high than for the decimal proportions lost in the lower vision. By giving a little working margin the opportunity of using round figures of easier application, and the difference that might result from applications of a progressive valuation, it was decided to adopt the following intermediary percentage:—

Reduction of vision of one eye: to 5/10 equals 10%; to 4/10 equals 15%; to 3/10 equals 20%; to 2/10 equals 25%; to 1/10 equals 30%; to 1/20 equals 33%.

6. In the reduction of both eyes equally:

A vision of 7/10 corresponds to a minimum vision of 5%; a vision of 1/20 corresponds to the minimum of visual capacity utilized for efficient work, i. e., an incapacity of 95%. For intermediary vision, it is possible to use the following scale in a progressive manner. Vision in both eyes, 6/10 equals 10%; 5/10 equals 20%; 4/10 equals 30%; 3/10 equals 45%; 2/10 equals 60%; 1/10 equals 75%.

7. In cases of unequal reduction of binocular vision, we consider the vision most useful for the subject is that of the eye less injured, and that, therefore, a base for the valuation must be that of the retention of the binocular reduction equal to the vision of the eye less damaged. It is evident that one must make a valuation of the damage higher than that taken as a base, and it is also clear that one cannot make a valuation that approaches that of cases of binocular vision corresponding to the eye most damaged. For simplicity in calculation, that would feature the uniformity of a valuation criterion, it was decided that it should be made the midpoint between the valuation corresponding to the equal binocular reduction of both eyes. So that in case of vision in O.D. 5/10; in O.S. 1/10, one would take the midpoint of the valuations of the monocular vision equal to 5/10 and 1/10, i.e., of 20% and 75%. The indemnity damage resulting would be 47, rated 5%.

This method apparently will give adequate valuation in cases with a notable difference between the vision in two eyes, and absence of binocular vision.

Note the valuation eventually that of the loss in one eye and reduction of the other to a vision at the highest point of the two eyes, so it can only be verified with a certain arithmetic calculation when the vision in one of the two eyes is of 1/20, and the other superior to 3/10; in such cases one applies the valuation on the hypothesis of the loss of one eye and reduction of the other to the measure less damaged.

8. In cases of blindness of one eye and reduction of vision in the other.

(a) The monocular vision 8/10 would correspond to damage immediately superior to the loss of an eye, i.e., 40%.

(b) Monocular vision of 1/10 corresponding to the minimum of utilizable capacity for vision for efficient work, i.e., damage of 95%.

(c) For monocular vision intermedi-

ary the following scale should be adopted. Vision of 7/10 equals 45%; 6/10 equals 50%; 5/10 equals 55%; 4/10 equals 60%; 3/10 equals 70%; 2/10 equals 80%.

The conclusions of the commission, after brief discussion, were approved unanimously.

They may be readily assembled in the following tables:

A. TABLE APPROVED BY THE CONGRESS.

Vision	Monocular Reduction Percentage	Equal Binocular Reduction Percentage	Blindness of one eye and reduction of other Percentage	Unequal binocular reduction
1	2	3	4	5
9/10	0	0	35	Arithmetic medium between the two valuations indicated in column three, for vision of either of the two eyes, in such a way as to extend in cases in which one of the two eyes has a vision of 1/20, the percent indicated in column four for the vision of the other eye.
8/10	0	0	40	
7/10	0	0	45	
6/10	5	10	50	
5/10	10	20	55	
4/10	15	30	60	
3/10	20	45	70	
2/10	25	60	80	
1/10	30	75	95	
1/20	33	95	100	
1/20	35	100	100	

B. SYNOPSIS OF THE VALUATION OF THE REDUCTION OF THE ACUTENESS OF VISION.

Vision O. D. / Vision O. S.	9/10	8/10	7/10	6/10	5/10	4/10	3/10	2/10	1/10	1/20	1/25-0
9/10	0	0	0	5	10	15	20	25	30	33	35
8/10	0	0	0	5	10	15	22.5	30	37.5	40	40
7/10	0	0	5	7.5	12.5	17.5	25	32.5	40	45	45
6/10	5	5	7.5	10	15	20	27.5	35	42.5	50	50
5/10	10	10	12.5	15	20	25	32.5	40	47.5	55	55
4/10	15	15	17.5	20	25	30	37.5	45	52.5	60	60
3/10	20	22.5	25	27.5	32.5	37.5	45	52.5	60	70	70
2/10	25	30	32.5	35	40	45	52.5	60	67.5	77.5	80
1/12	30	37.5	40	42.5	52.5	60	67.5	75	75	85	95
1/20	33	40	45	50	55	60	70	77.5	85	95	100
1/25-0	35	40	45	50	55	60	70	80	95	100	100

Belgium.

There is no official scale for disabilities from accidents occurring in vocations.

The percentage is determined by the judge; from the medical reports, in which the kind of work and the age of the injured person are considered. Leon in his commentary upon the law of 1903 established an approximate scale which varies in each case, depending upon the opinion of the judges.

Germany.

The Industrial Insurance Department at Berlin was merged into the Imperial Insurance Department on February 12, 1921.

The percentage of the various kinds of accidents in trades vary according to the kind of trade, and for these there are no authentic data. There are, however, a number of communications in the literature. What we have of the official registrar will be found in the report of the insurance office from 1886 to 1912, particularly on page 443 and following. Especially will be found some statistics for the year 1907, (published in Berlin, 1910, by Verlag von Behrend and Co.) relating to injuries of the eye from burns and caustics and scalding.

There are 30 and 100 of wounds and crushes, etc. 5.02 and 100 of other injuries occurring to the eyes. Of these 61.45 per cent have retained foreign bodies. Seven cases, i.e., 0.16 per cent of all eye injuries become total blindness. 303 cases, i.e., 6.78 per cent in the right and 314 i.e., 7.08 per cent in the left.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

ORTHOPTIC TRAINING.

The mass of muscle in the blacksmith's arm or about the shoulders of the boxer, are very obvious results of exercise—they have bulk and weight. But even for the blacksmith or the boxer, accuracy and quickness, skill and success, depend on the development of nerve cells and coordinations. These cannot be seen or weighed, but they are essential to the results sought. With the ocular muscles, changes of size and weight are not perceptible; and the increased power secured by orthoptic training lies to an even greater extent in the improved organization of related nerves and centers. The skilled musician does not have any remarkable muscular development, but an accurate perception of pitch and time, and a wonderful development of the power to coordinate with his sensory centers, the motor centers that control the manipulation of his instrument.

To speak of exercises for improving the coordination of ocular movements as "muscle training" is to ignore the essential object of the exercises, and encourages a habit of false or indefinite thinking about the real nature of defects of ocular movement. The person with perfect ocular movements generally cannot turn his eyes farther in any plane than the one with heterophoria, or actual squint. He can only turn them as he desires, more accurately, or more easily, with less of conflict and strain in the use of certain parts of his central nervous system.

Orthoptic exercises are for "nerve training." In general they require the nerve centers to initiate, and the nerve trunks and muscles to carry out, unaccustomed coordinations. They bring new distributions of nerve force from the motor centers, under guidance of the visual perceptions. Exactly how this is done we know little more than did the newsboy, who tried with poor success, to teach another how to fold his papers, and who concluded, "You just have to do it till you get the trick." The orthoptic exercises keep the pa-

tient trying till he "gets the trick," and later he finds that he has learned an easier or more accurate way of making his eye movements.

The mechanism of our ocular movements does not enter our consciousness. We are conscious of results attained, and a sense of effort to attain them. The changes that intervene and bring about the results are subconscious. But the effort must be made, and the movements guided by their effect on vision. The power to fuse and to see double, are essential to training in binocular movements and binocular vision. All forms of orthoptic apparatus depend for their usefulness on the presence of a fusion sense. But whether this sense is strong or feeble, real "exercise" is possible only by the patient making an effort.

In general, the younger the patient, the greater the capacity to learn correct ocular movements. This does not mean that the child has any less need than the adult to make an effort, to *try* to do the thing. His superior aptitude lies largely in his general readiness to try anything. The help given by apparatus, or the person who supervises such exercises, lies largely in the power to stimulate the child to make the effort of fusing the images, or keeping them fused. The training should be given as early as possible. But it is only possible, when the child's interest and cooperation can be secured; and it is profitable in exactly the degree that they are awakened.

For this reason attempts at orthoptic training are often unsatisfactory in young children. Sometimes an intelligent and highly interested mother can learn to supervise such training, so as to get important results at 2 or 3 years of age. But many children can be induced to make the necessary effort only by the exercise of great tact and patience. It is the possession of these qualities that makes some ophthalmologists successful with orthoptic exercises in a large proportion of cases, while others fail.

In a few patients one or two lessons in the coordination of their movements will lead to the establishment of correct habits of movement, especially if the faulty movements have arisen recently. In the greater number long persistence in the training is needful. Sometimes improvement will be noticed very quickly, in other cases no progress may be noticed for a long time, and then it may be rapid. In general it is hardly worth while to begin orthoptic training unless it can be kept up; at least its possibilities will not be developed in the individual case without prolonged, intelligent, tactful trial. Javal may have exceeded the truth in saying that probably all cases of early squint might be cured by orthoptic training; but certainly most ophthalmic surgeons will agree that in many cases such a cure would not be worth the trouble.

In later life we encounter patients who furnish ideal cooperation, who have a strong desire to overcome their defects of ocular movement; and have trained perseverance to keep up the effort needed to secure slow gains. These patients are at a disadvantage because of their loss of the plasticity of childhood; but only persistent trial can show how much they may gain. It may be true that the development of binocular fusion can only begin in early childhood. But even in a case of high squint, that has lasted for many years, we cannot be sure that the fusion power had not already developed to some extent before the squint began; and prolonged trial to elicit fusion may yield a positive response. In view of the limitation of our knowledge of this subject in general, we are justified in trying orthoptic training in every case of either heterophoria or heterotropia. Only in this way can we increase our knowledge of the general subject, or give the best service to the individual patient. E. J.

THE EVOLUTION OF BINOCULAR VISION.

It is generally recognized that among mammals, man and the animals most nearly related to him alone possess what we know as binocular vision.

How it arose is traced by Treacher Collins, in his Bowman lecture of 1921, to the arboreal life of our ancestors and their assumption of the erect posture. It seems intimately correlated with changes in the form of the crystalline lens and ciliary body, the extension of the powers of accommodation, more accurate vision at the macula and improved light adaptation and color perception.

The herbivorous animals "grasp their food directly with their mouths, finding that which is suitable more by smell and by the touch of their exquisitively sensitive snouts." They need a wide range of panoramic vision to quickly perceive their enemies, but do not require accurate vision at a fixation point or exact judgment of distances. The carnivorous animals have more need of accurate vision and judgment of distance to seize their prey. But when monkeys began to live in trees, to find nuts and fruit mostly by sight by accurate discrimination of form and color, seize food, parasites and weapons in their developing hands, the need for accurate vision at the point fixed and judgment of its relative distance, became essential.

The rabbit, the deer and the horse have widely separated eyes with very large corneas capable of perceiving objects in a very wide field, but not able to see very accurately in any part of it, and with little of the fields of the two eyes in common. In the cat the eyes have moved more to the front, so that both can see the prey to be seized and give an accurate judgment of its distance. But the cat's cornea is still large, so that the young kitten has a cornea closely resembling that of an adult human eye.

The cat can use the two eyes together, but not like men and monkeys. It has little accommodation to make exact near vision possible. Barrett found that the cat, with eyes thoroly under atropin, caught a mouse about as well as when its eyes were normal. Only among some monkeys has a power of accommodation anything like that in the human eye been discovered. Exact macular vision is useful only as the eye can be directed so that the image of the object of interest will make its impression exactly on the sensitive region. The more exact such vision the more exact must be the ocular movement that responds to it. The greater the dominance of macular vision the more important it is to have both maculas receiving the same image. Accommodation and convergence being closely associated in use, were closely associated in evolution.

The practical value of such studies lies in the better understanding they give of the nature and relations of defects of ocular movements. Binocular vision, recently evolved, is particularly liable to exhibit atavistic defects; and having been recently developed in the race, it is more dependent on development in the individual than are most other ocular functions. Here lies the explanation of why defects of binocular movement, squint and heterophoria, are so much more common than other congenital defects of movement. Here, too, is a reason for the large possibilities and importance of orthoptic training. E. J.

THE PHYSICIAN AND THE OPTOMETRIST.

Should there be any relation of the general profession to the optician? Yes and no. *Yes* in the one sense, for the mechanical work of finishing lenses and fitting frames, but absolutely no further. *No* as regards any relation of the physician to the prescribing optician. This word is final, and it is time that the medical profession be again warned against the attempts of the prescribing optician to secure consultations on equal terms with the doctor.

This warning is brought out by an article in the *Medical Sentinel* of Portland, Oregon, of February 1922, in which the editor takes the stand that "The measurement of the refractionist and muscular state of the eye is a limited specialty—it is the work of the optometrist or refractionist and not of the pathologist. Refractive errors are physiologic not pathologic. The optometrist is therefore in a position to cooperate

with the physician in a very efficient and satisfactory way."

These statements are manifestly false. In the first place, there are but few men uneducated in the general diagnostic science of medicine, who are able to even get the exact rule of thumb measurements of refraction as accurately as can the ophthalmologist. In the second place it is not always that the full measurement of the ametropia should be prescribed. It must be varied to suit not only the eye itself; but the condition of health, and of work that the person is doing who needs glasses if only in order to see better.

Many persons who feel the need of glasses, have some eye disease or general affection which could be discovered by a professional examination, and which in most cases is amenable to treatment, with the result of saving sight, bettering the health and preserving life.

Certainly the clerks in the stores, who call themselves opticians, have not sufficient knowledge to take care of such important conditions. Altho a large proportion of people first try the optician without going to an oculist, and we believe that the optician may be allowed to prescribe glasses to those people who directly apply, in simple cases, where to the layman there is no evidence of disease; the better class of opticians refer any cases in which there is evidence of disease to an ophthalmologist for further examination, and so far as the prescribing of glasses goes, the patient often finds out that it costs him less.

The very idea of physicians referring what is really medical work to nonmedical men is repugnant, impractical, and to the disadvantage of the patient. Let us hope that none of them will follow such maladvice as the editor of the *Medical Sentinel* gives.

This editorial is likewise an advertisement of a special optician, being a rank piece of editorial malpractice; and something indeed which the daily papers, or even those of the yellow variety, would not countenance; for their advertisements are confined to their advertising pages and not mixed up with such offensive "blurbs,"

H. V. W.

BOOK NOTICES.

Anatomy of the Human Orbit and Accessory Organs of Vision. S. Ernest Whitnall, M.A., M.D., B. Ch. (Oxon.), M.R.C.S., L.R.C.P. (Lond.) Prof. of Anatomy, McGill University, Montreal. Published by Henry Frowde and Hodder and Stoughton, London. Oxford University Press, American Branch.

This work comprises 427 pages, with 195 illustrations. The press work is excellent, and the illustrations, which are chiefly photographs of actual dissections, are quite good, many having exceptional merit. The text is divided into four parts: I. Osteology. II. Eyelids. III. Contents of the Orbit. IV. Cerebral Connections of the Nerves. This is followed by an extensive bibliography of papers from 1900 on, with some of the earlier, more important ones. A comprehensive index completes the work. A distinct service has been rendered to ophthalmology by the author in bringing together in this one volume the mass of information which it contains. It will prove invaluable for one who wishes to review the part of our subject with which it deals, and should be diligently studied by the beginner.

C. L.

When Robert W. Doyne, with the support of Sir William Osler, established the course at Oxford University, leading to a Diploma in Ophthalmology, no one could foresee in how many ways it would contribute to the development of ophthalmic science. That course differed from the graduate courses preiously offered by giving a prominent place to study of the fundamental branches, anatomy, physiology and pathology. The teachers of these branches found a lack of textbooks suited to this purpose, and as a result three very important works have been added to our literature. Arthur Thomson, the Professor of Anatomy, published his Anatomy of the Human Eye with its stereoscopic plates; George J. Burch, teaching physiology wrote his book on Practical Exercises in Physiological Optics; and now we learn

that the work before us "originally formed the substance of a series of lectures given to candidates for the Oxford Diploma of Ophthalmology."

Few of us can ever attend the course at Oxford, or either of the systematic courses that are now being given in American institutions; but every one engaged in ophthalmic practice may obtain and carefully read this work. By so doing he will improve his equipment for practice, in a point in which he will find it was particularly weak.

Even one who has given some especial attention to the anatomy of the human orbit, and has made several dissections of the parts, finds much in this work that is new and suggestive. Much excellent investigation has been devoted to the anatomy of the orbit; but no work hitherto published has brought its results together. For the most part these have been buried in journals and transactions devoted to anatomy and physiology; and those who could make practical use of the observations have not known of their existence.

Of the 195 illustrations, mostly original, not one shows an instrument or piece of apparatus bearing the author's name. It is a surprise to find how much of importance such illustrations can teach. In some of them a whole lesson stands out at a glance; as in the photographs of the surface of the orbital region, pp. 8 and 171, on which are outlined the important deeper structures, in such a way as to show their relations to surface landmarks at once, and impress them clearly on the memory.

While part IV, the cerebral connections of the nerves, takes the reader out of the orbit, and is properly termed an appendix, it admirably supplements the account of the nerves given in the preceding part, on the orbital contents. Largely by means of the 8 illustrations it contains, it gives in 18 pages a very clear conception of the intricate anatomic arrangement of the visual and ocular motor nerve tracts.

On every account we welcome this addition to ophthalmic literature.

E. J.

Transactions of the Pacific Coast Oto-Ophthalmological Society. Ninth annual meeting at Seattle, Wash., July, 1921. Paper cover, 155 pages. Published by authority of the Executive Committee. [See also p. 241.]

This society is the organization of the ophthalmologists of seven states, having an area greater than that of the combined European countries, Great Britain and Ireland, France, Germany, Belgium, Holland, Denmark, Switzerland and Italy; with seven cities of over 100,000 population each; and a population better able to support good ophthalmologists than that of any country of Europe. This region is new and lacks scientific institutions; but it has some of the best trained ophthalmologists in the world, and some of their best scientific observations are published in these transactions. It ought not to surprise us to find here as good papers and discussions as appear in any society proceedings.

Printed in type of the same size, with an equal number of illustrations, this volume would be about the same size as that of the American Ophthalmological Society transactions. Of the papers and discussions, about one-third refer to matters of ophthalmic interest, rather less to oto-laryngology, and nearly half are of interest in both of those special branches. The absence of any table of contents or index constitutes a very grave defect for this volume of transactions, that should be useful as a work of reference.

E. J.

Diseases of the Eye. Ninth Edition, by **George E. de Schweinitz**, M.D., L.L.D., Prof. of Ophthalmology in the University of Pennsylvania, etc. 832 pages, 415 illustrations, with 7 colored plates. Philadelphia and London. W. B. Saunders Co.

We refer again to this work (see v. 4, p. 786) to illustrate a lesson taught by every text book that runs thru many editions, and maintains its position as a standard authoritative work covering its department of medicine. Such a

book does not continue to sell, successive editions are not called for, simply because it was the best book on the subject. It is kept the best book by the author and publisher going thru the labor of preparing and putting forth successive editions.

Ophthalmology is progressing and developing. Only by closely following its progress and development could any book keep the hold on the interest of the profession, that this one has kept for thirty years. If all the text books continued to reflect the present state of the knowledge and literature of their departments of medicine, the profession at large would be less dependent on year books and abstracts for the recent advances with which it is a duty to be familiar.

E. J.

Transactions of the College of Physicians of Philadelphia, Third Series, Volume 42, 1920, Edited by Walter G. Elmer, 548 pages, illustrated. Published by the College.

This volume interests our readers as containing the proceedings of the Section on Ophthalmology, which have already been published from month to month in this JOURNAL. These proceedings occupy about one-sixth of the volume. In addition to these, there are two papers on arteriosclerosis that are of value to the ophthalmologist who has to bear this condition in mind, in all his ophthalmoscopic examinations of patients past middle life. There are also three papers on recent therapeutic advances.

But this volume is most notable for five papers on Sir William Osler by McCrea, Hare, Burr, Packard and Norris, men who knew him from the days of his teaching in Montreal to his entertainment of American officers at Oxford near the close of his life. Of equal interest to a smaller circle of readers is a similar series of papers regarding Horatio C. Wood, by de Schweinitz, Dercum, Hare and Mills, with a posthumous "Reminiscences of an American Pioneer in Experimental Medicine" by Professor Wood himself.

E. J.

BIOGRAPHIC NOTICE.

FREDERICK PINSENT MAYNARD.

The three great lights of British Indian Ophthalmology have left India; and one, our distinguished confrère, Lt. Col. Maynard, has finished his earthly life, passing away at Audlem, Cheshire, England, Sept. 30, 1921. He had recently retired from the Indian Medical Service and going to England, practiced at Crewe. He and his wife had made arrangements to attend the International Ophthalmological Congress this year in Washington, and after that to tour America, visiting a number of his old friends in the profession.

It is sad to think that so gentle a philanthropist, in the direct sense *amicus humani generis,* should be denied the green autumn of ease and the dignity which he had earned by his splendid service in Calcutta; and especially not to have been given the opportunity to have further elaborated his most important contributions to ophthalmology. As with others of the Indian triumvirate, he had an exceptional opportunity in operative ophthalmology during service in India, having done over 14,000 cataract operations and thousands upon thousands of others.

Perhaps he was best known for his work on Glaucoma. In addition to this in 1908 he published a most excellent book on Operative Ophthalmology, with a second edition in 1920. He also wrote many papers in medical channels, contributing from time to time to the American Journal of Ophthalmology. He received the degree of M.B. Durh., with honors; D.P.H., Cambridge, and F.R.C.S., England.

His record in the Indian Medical Service was as follows:

1887 to 1892: Military duty, including Field Service Hazara (Black Mountain) 1891, medal and clasp.

1893 and 1894: Superintendent, Patna Opium Factory (2000 to 3000 work people in busy season).

1895 to 1901: Civil Surgeon of Ranchi, Hazaribagh, Patna and Darjeeling, (in charge of civil hospital and special eye wards).

1896: Medical Officer and Naturalist with the Baluch-Afghan Boundary Commission.

1902 to 1919: Professor of Ophthalmic Surgery, Medical College, and Ophthalmic Surgeon, Medical College Hospital, Calcutta (55 beds) and Surgeon Superintendent, Mayo Native Hospital, Calcutta (105 beds).

1908: On special duty to Lahore to attend His Majesty the late Amir Habibullah of Afghanistan, (as Ophthalmic Surgeon.)

1912: Coronation Medal, in connection with the visit of her Majesty, the Queen to the Medical College, Calcutta.

1908 to 1918: Fellow of the Calcutta University.

Aside from this he was a most delightful gentleman to meet. He was a high Mason, the jewel of his lodge being a beehive, its motto being industry and perseverence, which describes his character. He was fond of outdoor work and was noted as an apiarist. In his family relations he was most fortunate, his wife being his companion and interested in his medical vocation as well as in his other avocations. His daughter is a noted designer, having recently finished designing some of the new stamps for England. Personally we miss him, but for many years his name will be known in ophthalmology thru the printed words that he has left us.

HARRY VANDERBILT WUERDEMANN.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville Tenn.; Dr. Gaylord C. Hall, Louisville, Ky. Volunteers are needed in other localities.

DEATHS.

Dr. George A. Hill, Philadelphia, aged seventy, died January 23rd.

Dr. John Kurrus, New York City, aged fifty-six, died suddenly from heart disease, January seventeenth.

Dr. Louis H. Landman, Cincinnati, aged sixty-two, died January 26th, in Palestine, where he had gone to practice his profession among the Jewish colonists.

Dr. Lovell Moss, Gibraltar, died January 24th, as the result of an accident.

Dr. Charles Wray, of London, for 32 years a member of the Ophthalmological Society of the United Kingdom, died recently at the age of sixty-three.

PERSONAL.

Dr. Ralph I. Lloyd, of Brooklyn, has removed to 14 Eighth Avenue.

Dr. James C. Braswell, formerly with the Mayo Clinic, has located at Tulsa, Oklahoma.

Dr. Dean Ely Godwin, formerly of Houghton, Michigan, announces the opening of his offices at Long Beach, California.

Prizes in ophthalmology were awarded by the Cuban Medical Congress to Doctors Juan Santos Fernandez and J. M. Penichet.

Dr. Ruth Alexander has opened offices in the Alexander Young Building, Honolulu, and has limited her practice to eye, ear, nose and throat.

Dr. C. Duane Cobb has returned to his offices in the Physicians Building, Oakland, California, after an absence of three years spent in the clinics of Boston and New York.

Dr. A. O. Shaw, Ashland, Wisconsin, stopped over a few days in Honolulu. He is on his way to New Zealand, Australia, Philippine Islands, China, and Japan. He expects to be gone about six or eight months.

Dr. John E. Weeks, of New York City, is spending a month in Honolulu. He has been over to see the big volcano on Hawaii and expects to take several other trips to other islands while here. He is taking a much needed rest, and says this is the place to take it.

Dr. McCluney Radcliffe, of Philadelphia, has resigned as Attending Ophthalmic Surgeon to the Presbyterian Hospital, and was appointed Consulting Ophthalmologist to the same institution. Dr. H. Maxwell Langdon was appointed to fill the vacancy created by the resignation of Dr. McCluney Radcliffe.

Prof. Alfred Vogt, Director of the Ophthalmological Clinic of the University of Bâle, announces an eight days' course of instruction in the investigation of the living eye with the slit light, for September, 1922. Inquiries and requests for admission to the ophthalmological clinic, should be addressed to Mittlerestrasse, Bâle, Switzerland, before May thirty-first.

Dr. and Mrs. Casey Wood, accompanied by Dr. and Mrs. Harold Gifford, Mr. C. W. Davis, the American Consul, and Mr. Fred Shorey, of Montreal, spent the month of February in the Kaieteur, and even further in the interior, in British Guiana, for the purpose of making a study of the local birds. Dr. Wood returns to the United States in time to attend the International Ophthalmological Congress at Washington, in April.

SOCIETIES.

The eighteenth semi-annual session of the Sioux Valley Eye and Ear Academy was held at Sioux City, Iowa, January 24th, under the presidency of Dr. Frank I. Putnam, of Sioux Falls, South Dakota.

The February meeting and dinner of the Kansas City Eye, Ear, Nose and Throat Society was held at the Hotel Muehlebach. Dr. Joseph Lichtenberg presented a paper on "Glaucoma Following Eye Operations."

At the November 16, 1921, meeting of the Interurban (Duluth-Superior) Academy of Medicine, Dr. T. H. Shastid, of Superior, read a paper in appreciation of the late Dr. C. D. Conkey, who was the first physician in North Wisconsin to limit his practice exclusively to the eye, ear, nose and throat.

Dr. John E. Weeks, of New York City, was a visitor in San Francisco during January. He attended a meeting of the Eye, Ear, Nose and Throat Section of the San Francisco County Society, held at the University of California Hospital. The university staff was in charge of the meeting, and a very interesting program was given.

Under the auspices of the Ophthalmic Section of the St. Louis Medical Society, Professor Ernst Fuchs, of Vienna, gave a course of lectures during the month of February. This course was attended by sixty-one ophthalmologists from St. Louis, and thirty-there from other cities. Special ophthalmologic and oto-laryngologic clinics were held by the local men for the visiting physicians.

A section on ophthalmology of the Associated Out-Patient Clinics of New York was organized on January 24th, with the following officers: Dr. W. E. Lambert, chairman; Dr. E. S. Thomson, vice-chairman; Dr. Conrad Berens, secretary. The subject, "How Can We Best Regulate Refraction Work in Eye Clinics?" was discussed by Dr. E. S. Thomson, and "How Can the Admission of Patients Be Better Controlled?" by Dr. J. M. Wheeler.

The annual meeting and election of officers of the Puget Sound Academy of Ophthalmology and Oto-Laryngology was held at the University Club of Seattle, January 31, 1922. The following officers were elected to serve for the ensuing year: President, Dr. Frederick Adams, Seattle; first vice-president, Dr. D. H. Bell, Tacoma; second vice-president, Dr. Wm. G. Cameron, Tacoma; secretary, treasurer, Dr. John H. Harter, Seattle.

At the annual election of the Portland Academy of Ophthalmology and Oto-Laryngology the following officers were elected for 1922: President Dr. Gertrude French; vice-president, Dr. Ira E. Gaston; secretary-treasurer, Dr. Andrew Browning. Dr. J. L. McCool, Portland, Oregon, has been appointed chairman of a committee on entertainment for visiting ophthalmologists attending the International Congress of Ophthalmology, to be held in Washington, D. C., in April of this year.

The meeting of the Pacific Coast Oto-Ophthalmological Society will this year be held at Salt Lake City, Utah, September 14, 15, and 16. The time is chosen when this region is particularly attractive and when the members can proceed thence to the meeting of the American Academy of Ophthalmology and Oto-Laryngology at Minneapolis which begins September 19th. Ophthalmologists from other parts of the country, who can attend this interesting meeting, should communicate with the secretary, Dr. Edward D. LeCompte, Boston Building, Salt Lake City, Utah.

The eye, ear, nose and throat men of St. Joseph, Missouri, were hosts, on January 19th, to the Kansas City Eye, Ear, Nose and Throat Society, and also to men practicing these specialties from Chicago, Lincoln, Nebraska, Omaha, Topeka, Oklahoma City, Springfield, Missouri, Dover City, Iowa and other cities. A splendid operative and diagnostic clinic was held at the Noyes Hospital in the afternoon at which the local men operated as also did Dr. Joseph Beck, of Chicago; Drs. W. H. Schutz, Sam Roberts, and H. E. Thomason, of Kansas City. In the evening a medical dinner was given at the Benton Club, where papers were presented by Dr. W. P. Wherry, and Dr. James M. Patton, of Omaha. Drs. L. R. Forgrave, W. C. Proud, W. H. Minton, and E. C. Ambrose, of St. Joseph, were responsible for the clinic.

The annual meeting of the Indiana Academy of Ophthalmology and Oto-Laryngology was held in Indianapolis on January 18th and 19th, at the Claypool Hotel. There was a dinner and evening session the first day at which Dr. Harry Pollock, of Chicago, delivered an address on the "High Spots in Oto-Laryngology." Those who took part in the eye program the next day were Dr. George F. Keiper, of Lafayette; Dr. F. McKay Ruby, of Union City; and Dr. E. J. Lent, of South Bend. The newly elected officers are: President, Dr. Delbert O. Kearby, Indianapolis; first vice-president, Dr. George C. Knapp, Vincennes; secretary-treasurer, Dr. Bernard J. Larkin, Indianapolis.

MISCELLANEOUS.

The New York Association for the Blind received a bequest of $5,000 by the will of the late Ida Barth Iden.

The New York Ophthalmological Hospital was left $150,000 by the will of the late Commodore E. C. Benedict, of Greenwich.

Current Literature

These are the titles of papers bearing on ophthalmology received in the last three months. Later most of them will be noticed under Digest of the Literature. They are given ni English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

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Van Lint. Oculopalpebral fixation forceps. (1 ill.) Bull. de la Soc. Belge d'Opht., 1921, v. 44, p. 38.

Repeated titles. **Holland,** (O. L., 1921, v. 17, p. 542). A. J. O., 1922, p. 158.

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Froehlich, F. W. Influence of light and dark adaptation on course of periodic after images. Zeit. f. Sinnesphys. 1921, v. 53, pp. 79-107.

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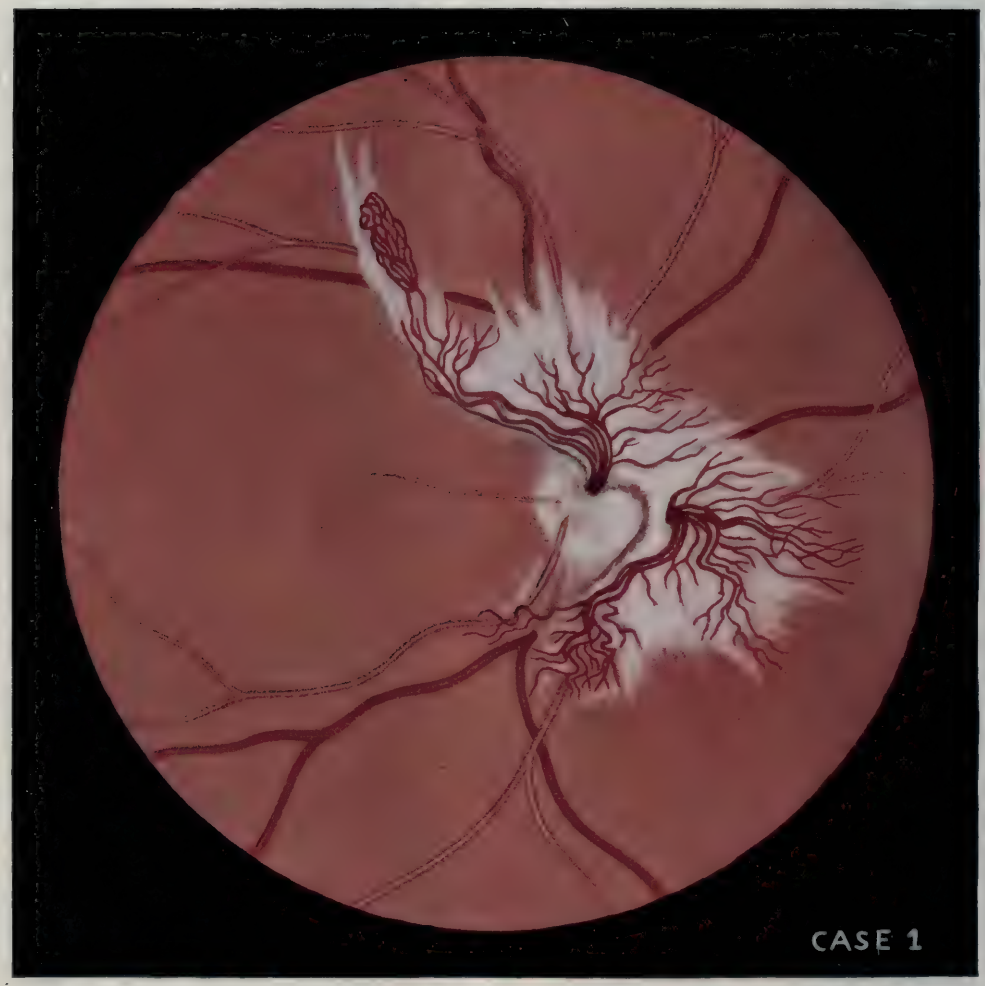

RETINITIS PROLIFERANS WITH VENOUS VARICES AND ANASTOMOSES (WURDEMANN)

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RETINITIS PROLIFERANS.

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A brief review of the factors that probably determine the occurrence of retinitis proliferans after hemorrhage into the vitreous is given. Two cases are reported in which there was extensive development of this kind with the formation of varices and new formed vessels. Read before the Puget Sound Academy of Ophthalmology and Oto-Laryngology, April, 1921.

The object of this communication is mainly the perpetuation of the two accompanying colored illustrations, which demonstrate the macroscopic pathology as seen by the ophthalmoscope.

It is likewise desired to emphasize the fact that, while most cases of retinitis proliferans are associated with a direct traumatic, causative origin, there must be an underlying etiologic factor in the condition of the blood, which predisposes to rapidity of coagulation and slowness of absorption of hemorrhages, followed by the organization of the blood clot.

These conditions are met with in diabetes or temporary increase in the sugar content of the blood. Very few retinal or vitreous hemorrhages result in this organization; the vast majority of cases of real retinitis, sclerosis of the blood vessels, and trauma attended by hemorrhagic retinitis, do not proceed to the proliferation of connective tissue and hence, while these are the actual causes of the hemorrhage, they are by no means an essential factor in the metabolic changes.

According to Collins and Mayou, the coagulability of the blood is raised, and this leads to formation of thrombi in the venules, which rupture as the result of the vis a tergo.

The bleeding followed by proliferation is always venous—never arterial. Fresh bleeding is partially removed thru the central vascular canal, but the greater part is disintegrated in situ, and taken up by the migratory cells which originate from the ciliary processes and the connective tissue network of the papilla.

Oguchi thinks that a mechanical irritation caused by these cells, results in glial hyperplasia of the retina, and that true retinitis proliferans arises from connective tissue formation derived from the perivascular tissue of the papilla, and that there must be contact of the vitreous hemorrhage with the surface of the papilla.

One of my pictures seems to illustrate this point, as the new membranes arise from the papilla. In the other, however, despite proliferation of a vascular network on the papilla, the large mass of membranes is seen actually to arise from the superior temporal vein, and here is shown a remarkable increase in the venules. In this case there are two other hemorrhages which have not proceeded to proliferation.

According to Collins and Mayou, the steps of the process are as follows: If the coagulation of the blood is high, coagulation takes place more rapidly than usual and absorption follows slowly. The corpuscles discharge their hemoglobin, the stroma is broken up and cholesterin is formed. The fibrin is either absorbed or becomes organized. The endothelial cells from the blood vessels spread into the vitreous and bands of connective tissue form.

It has been the author's clinical experience to have seen a number of cases of diabetes with retinal disease, and in

those that went on to leakage of the blood into the retina and vitreous, more or less proliferation of connective tissue into the structures was found. So he is of the mind that the endotoxins of the diabetic conditions are a causative factor in the production of the ocular affection, and that laboratory studies would often show diabetes in these cases, and that there is always a change in the blood which promotes extreme coagulability, which is the reason for the slow absorption and subsequent organization into connective tissue.

RETINITIS PROLIFERANS WITH VARICES AND ANASTOMOSES OF THE VEINS OF THE OPTIC DISC.

CASE 1. Y., Robert O., American birth, Pvt., Co. 59, 166 D.B., aged 25, Sept. 5, 1918. Six months before noticed floaters before R.E., when working as farmer. Had facial erysipelas at 15 yrs. Treated by eye specialist previous to enlistment. V.R., 20/30; L. 20/15. V. F.; R., contracted irregularly above; L., normal. Not improved by glasses. History in clinic and ward shows some hemorrhage about region of the R.O.D. Present condition shows unusual picture of thin delicate membrane arising from adventitia of vessel walls with extensive new venous vessel formation, forming at region of upper temporal vein a true varix. At other places the veins do not anastomose. The focussing on the new vessel formation is +6.00 to +10. D.

CASE 2: S., Mrs. Henry, Jewish, aged 58, March 3, 1921. Has had diabetes mellitus 8 years. Bell's palsy L., 5 years ago. Nearly complete recovery after one year. Now has to pass urine every half hour to hour. Under treatment by Dr Geo. Horton. B.P., 158-over 96. Reduced vision for year or more. Can't get glasses to suit eyes from opticians. A marked example of typical diabetic retinitis in both eyes. V.R., 6/60; L., counts fingers at 1 m. The right is most interesting on account of the new vessel formation. A true varix composed of fine veins over temporal portion right disc and an extensive subdivision of the superior temporal vein, which ramifies thru a membrane overlying the retina +3 or +4 D. On or about the macula will be seen characteristic diabetic spots of degeneration. To the nasal side is apparently the remains of an old hemorrhage from a vein, and below it is a recent fibrinous exudation from an artery with some blood remains. In the left eye there is an extensive proliferating retinitis with many recent hemorrhages.

SPEED OF ACCOMMODATION AS A PRACTICABLE TEST FOR FLIERS.

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This is the report of an investigation made in the Department of Ophthalmology Medical Research Laboratory and School for Flight Surgeons, Mitchell Field, Long Island. The tests employed seem to have been partly tests of memory as well as of the time of accommodation. It is concluded that other tests which are necessary will exclude those who are disqualified because of slow accommodation unless possibly in cases of presbyopia. Authority to publish from the Surgeon-General, U. S. Army.

PURPOSE: It was believed that the speed of accommodation of the eyes possessed by a pilot played an important part in flying, especially in combat work, landings, and other maneuvers in which it was necessary for a pilot to focus his vision from far to near objects and vice versa.

Research work was accordingly undertaken in this laboratory to ascertain the relationship, if any, of the speed of accommodation to other properties of the eyes, such as visual acuity as manifested by the ability to read Snellen test type at 20 feet; depth perception as elucidated by the Howard-Dolman depth perception apparatus; the power of accommodation as determined with the Prince rule; the strength of the internal and external recti muscles as measured by the angle of convergence and the power of prism divergence; retinal sensitivity as obtained from the Cobb retinal sensitivity apparatus. For this purpose sixty (60) subjects were examined, and the results charted and correlated with the various parts of the eye examination given to fliers, as well as with the retinal sensitivity test.

The subjects, according to the results of the eye examination were divided into three classes: (1) a general class embracing both those qualified, and those disqualified because of ocular defects other than speed of accommodation, (2) those qualified, and (3) those disqualified by the examination. Means were established on each of these classes to determine if any candidates, otherwise qualified for flying, would be disqualified because of possessing a low speed of accommodation, and to establish, if possible, a lower speed limit for all cases presenting themselves for examination. Also, it was desired to ascertain if there were any candidates otherwise disqualified possessing a high speed of accommodation.

TECHNIC: The apparatus used in determining the speed of accommodation was the tachistoscope developed by Professor C. E. Ferree of Bryn Mawr College.*

It is devised so that three test letters (2 near, one at the left, the other at the right, and one far in the middle) are exposed simultaneously to the observer and are then cut off from his view one at a time in a fixed order. "This is done by means of light-weight discs of variable open and closed sectors turned by means of a bar fastened at its center to the axle to which the discs are attached, and provided with adjustable weights on both arms." "The length of exposure can be varied either by changing the width of the open sector or the position of the weights on the arms."

The test letters used were the illiterate "E"s, mounted so that they could be rotated to point in different directions. The working distance of the far test object was 6 meters and of the near test objects 30 cm; the visual angles subtended in each case were 6′ 42″ and 9′ 10″. The brightness of the far test card was 10.40 candles per square foot; of the right and left test cards 1.68 and 1.16 candles per square foot respectively.

*For a detailed description of the apparatus see C. E. Ferree and Gertrude Rand. The Inertia of Adjustment of the Eye for Clear Seeing at Different Distances, American Ophthalmological Society's Transactions, 1918. Edwin B. Goodall. The Speed of Accommodation, Air Medical Service Circular, March 1920.

After a completed exposure, the subject was required to report the direction in which each of the "E"s was pointed. In order to perceive these successfully, he had first to focus on the near "E" at the left, then adjust for the far "E" in the center, and finally accommodate for the near "E" at the right. After a short practice period with slow speed, the exposure times for each letter were gradually shortened until the point was reached where the subject could just discriminate each. Then three correct judgments out of a possible five for a given setting of discs were required. The various exposures; near, near to far, near to far and back to near were recorded in terms of degrees of open sector and converted into time by a process of calibration. In working up the results, however, only the total time required for the complete excursion was used.

Results: The two curves show the distribution of results for the sixty cases examined in our series, and for the hundred cases examined by Goodall.

Table 1 gives the means and medians together with the probable errors of the results obtained. The means and medians of Goodall's cases, 89 of whom were aviators, have been computed and added for their comparative value.

Table Ia shows these same central tendencies when extreme cases have been omitted by Chauvenet's criterion.

Table II gives correlation values between speed of accommodation and the results of the various phases of the eye examination for fliers, as well as a retinal sensitivity test and with age.

Table III gives the speed of accommodation and the refractive correction of those cases disqualified because of high refractive error.

Discussion and Interpretation of Results: As appears in Tables I and Ia, and the distribution curves, our results were essentially the same as those obtained from Goodall's data. The eliminating of extreme cases from our group renders our mean almost identical with that obtained from his results. Altho the mean time for the 16 cases which were disqualified by the eye examination given to fliers is somewhat higher than that for the 44 cases which were qualified, this difference as measured by its probable error is not great enough to be significant.

Two cases whose speed was so slow as to permit their elimination on the basis of Chauvenet's criterion were

TABLE I.

	No. of cases	Mean P.E. secs	Median P.E. secs
Entire group	60	1.563±0.026	1.525±0.032
Qualified by Eye Exam.	44	1.536±0.031	1.500±0.039
Disqualified by Eye Exam.	16	1.637±0.044	1.575±0.055
Goodall's Group....	100	1.526±0.017	1.482±0.017
Aviators, Goodall's Group	89	1.505±0.015	1.468±0.022

TABLE Ia. EXTREME VALVES OMITTED BY CHAUVENET'S CRITERION.

	No. of cases	Mean P.E. secs	Median P.E. secs
Entire group	58	1.528±0.020	1.517±0.025
Qualified by Eye Exam.	42	1.496±0.021	1.498±0.026

TABLE II.

Type of test	No. of cases	r	P.E.R.
Visual Acuity, R.E.....	60	0.307	±0.079
Visual Acuity, L.E.....	60	0.326	±0.078
Depth Perception	60	0.336	±0.077
Prism Divergence	60	0.009	±0.087
Av. Accommodation for 2 eyes	60	0.369	±0.075
Angle of convergence.....	60	0.240	±0.082
Retinal Sensitivity	60	0.167	±0.084
Age	60	—0.331	±0.078
Age, cases qualified by Eye Exam.	44	—0.526	±0.075

TABLE IIa. EXTREME CASES OF TABLE II OMITTED BY CHAUVENET'S CRITERION.

Type of test	No. of cases	r	P.E.R.
Visual Acuity, R.E.....	57	0.235	±0.084
Visual Acuity, L.E.....	57	0.406	±0.075
Depth Perception	57	0.244	±0.085
Prism Divergence	57	—0.052	±0.089
Av. Accommodation	58	0.204	±0.085
Angle of Convergence.....	58	0.250	±0.083
Retinal Sensitivity	57	0.210	±0.085
Age	58	—0.097	±0.088
Age, qualified by Eye Exam.	42	—0.166	±0.111

TABLE III.

Subject	Time secs.	Refraction R. E.	Refraction L. E.
G. B. M.	1.226	+ 2.25 Sp.	+ 2.50 Sp.
J. J. M.	1.468	+ 1.25 Sp. ⊃ + 0.25 cyl ax 90°	+ 1.25 Sp. ⊃ + 0.75 cyl ax 90°
J. H. H.	1.487	+ 3.00 Sp.	+ 3.00 Sp.
H. T. D.	1.542	— 0.75 Sp. ⊃ + 1.50 cyl ax 90°	— 0.75 Sp. ⊃ + 1.50 cyl ax 90°
A. C. M.	1.698	+ 2.25 Sp. ⊃ + 0.50 cyl ax 90°	+ 2.25 Sp. ⊃ + 0.50 cyl ax 90°
V. T. S.	1.995	— 1.75 Sp.	— 1.75 Sp.

qualified by the examination. This was undoubtedly a matter of age, as the high negative correlation between speed and age (Table II) becomes practically negligible when these cases are eliminated (Table IIa). The two men were 37 and 39 years of age, and their slow speed is interpreted as being indicative of the initiation of presbyopia.

certain cases, exercise a degree of accommodative effort sufficient to overcome a certain amount of its accommodative deficiency.

Visual acuity, depth perception, and extent of accommodation all show a moderate degree of correlation with speed, but with the omission of extreme cases the correlation between the visual acuity of the left eye and

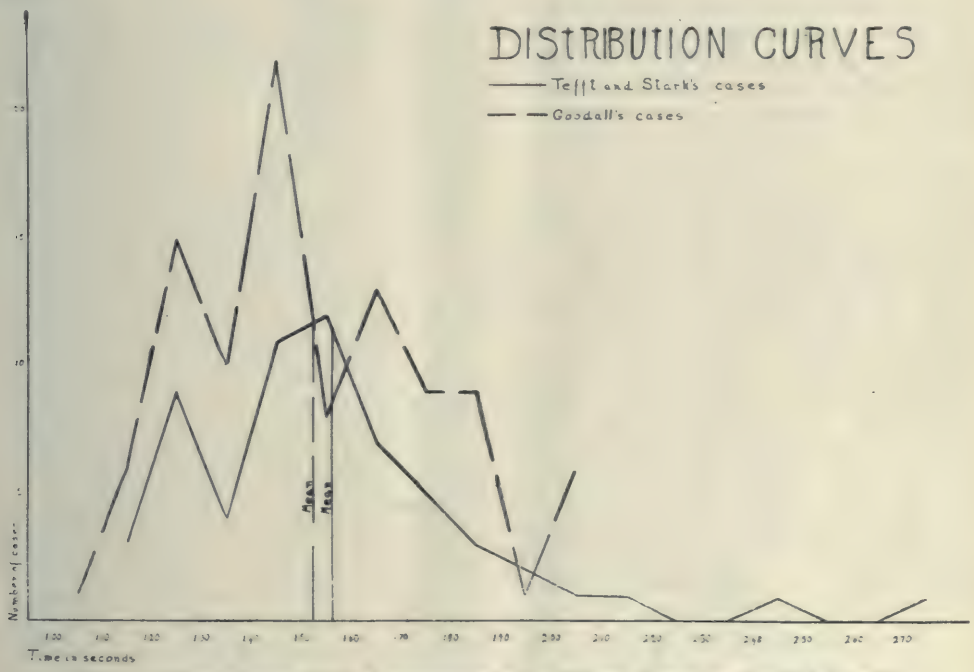

Fig. 1. Graphs showing speed of accommodation in different groups as classified in tables.

It has been suggested that these two cases might have been disqualified, if the disqualifying limit for the power of accommodation were made more rigid. At present, a leeway of two diopters above or below the normal for each age as determined by Duane, is allowed. The normal power of accommodation for the ages 37 and 39 according to Duane's table is 6.8 and 6.2 diopters respectively. The actual power of accommodation of the two cases in question was for the one case, 6.5 D both eyes, and for the other, 5.25 D., R.E. and 5.00 D., L.E. Altho both of these cases are below the normal, they are well within the two diopter limit set. Where the question of speed is not involved the eye can, no doubt, in

speed of accommodation becomes the most significant. The power of prism divergence bears no relation at all to speed of accommodation, as judged from the value of r obtained; and the correlation between retinal sensitivity and speed is not high enough to be significant.

It will be seen from Table III that the six cases disqualified because of high refractive error have a wide range of speed, one of them falling in the group of the best 15% of the cases and another among the poorest 15%. These few cases show no correspondence between decreased speed and extent of refractive error.

If we were to adopt 2 seconds as the lower speed limit, 4 of our 60 cases

would be disqualified because of slow speed of accommodation, the two qualified cases already discussed and two others which were disqualified by the eye examination. Both of these latter two had defective depth perception, and one had visual acuity of less than 20/20 as well. From Goodall's group this limit would disqualify 6 cases, 4 of whom were fliers.

If the limit were made 1.90 seconds, two more of our cases would be disqualified, making a total of 6. But these two cases were also disqualified by the eye examination, one because of defective visual acuity, depth perception, muscle balance, angle of convergence, and refraction; the other, because of subnormal visual acuity. Turning to Goodall's data, we find that this limit would eliminate 7 of his cases, 5 fliers, whose number of flying hours ranges from 90 to 250.

Conclusions: 1. While this method of testing speed of accommodation is satisfactory in determining the actual speed, unquestionably it is also a test, to a certain extent, of immediate memory. Many of the subjects complained that they could not remember the sequence in which the letters disappeared, altho they felt confident that they had seen all the letters correctly.

2. The apparatus in its present form is cumbersome and the intricacies of operating it are too numerous to make it feasible for use in a routine examination. Another drawback to its use is found in the fact that a large number of subjects seem to find difficulty in adapting themselves to this particular test situation, and require a long practice period before they can make a correct report of all three test letters. In certain cases, however, it might be used advantageously.

3. While most of the subjects of this series were nonfliers, the results obtained on them do not justify the conclusion that fliers (Goodall's group) possess a materially faster speed of accommodation than nonfliers.

4. While the theoretic importance of the speed of accommodation is recognized, it is believed that those possessing a degree of speed of accommodation which might endanger their flying, possess other deficiencies which can be more easily detected. A possible exception might be found in cases where presbyopia has begun. Since the other tests disqualify the majority of cases with slow speed of accommodation, it is not necessary to establish a disqualifying limit for speed of accommodation. On the other hand, this test could not supplant the routine examination, as a number of disqualified candidates showed better than average speed of accommodation.

5. According to the observations of one or two fliers, this test as given, places much greater strain on the eyes than is required in any flying situation. This is undoubtedly true, since the figures on the dials of the plane are farther away and subtend a larger visual angle than the near "E"s used in the test. If this test were to be adopted as a routine test, it would be better to establish standards using larger test type, thereby more nearly duplicating flying conditions.

MONOCULAR AND BINOCULAR JUDGMENT OF DISTANCE.

BARBARA VALETTE DEYO

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The studies here reported and summarized in Fig. 1 seem to show that binocular parallax is the essential factor in depth perception, and hence that for accurate judgment good binocular vision is necessary. The standard heretofore required might properly be raised. These studies were made in the Department of Aviation, Psychology Medical Research Laboratory and School for Flight Surgeons, Mitchell Field, L. I., N. Y. Authority to publish from the Surgeon-General, U. S. Army.

The material for this article was obtained by Captain Bascom H. Palmer, Medical Corps, ophthalmologist at the Medical Research Laboratory, Mitchell Field, N. Y., from the examination of one hundred subjects comprising airplane pilots, and officers and men of other branches of the service. His problem was to investigate the quality of depth perception judgment, as measured by the depth perception apparatus, and compare the judgments made with monocular and binocular vision. The following data were complete for each subject: (1) ten judgments of depth perception (measured in millimeters) using binocular vision, (2) ten judgments using the right eye only, (3) ten judgments using the left eye only, (4) the visual acuity for each eye, tested by the Snellen test types, and (5) the angle of convergence. In each case it was noted whether the sighting eye was right or left.

The subjects were given the standard examination for flying, and were rated qualified or disqualified on the findings of the examiner.

For measuring visual acuity the regulation Snellen test charts were used, the examinee occupying a chair twenty feet away from the wall upon which the charts were arranged. To qualify on this test the subject must have a visual acuity of 20/20 for each eye. The instrument with which the judgments of depth perception are made is known as the depth perception apparatus. It may be described as the front, back and floor of a rectangular box, the sides and top of which are open. The floor is 21 3/4 inches from front to back and 13 1/4 inches wide, and the height of the back and front is 11 1/2 inches. In the front is cut a window whose lower margin is 4 inches from the floor and whose outer margin is 2 3/4 inches from the side of the apparatus. The entire apparatus is painted a dull black and the anterior surface of the back covered with a square of dead white cardboard.

From front to back of the floor of the apparatus runs a scale, ruled off into centimeters and divided into millimeters. Beginning at the front end of the box, the scale is numbered from 500 mm. up to 1450 mm. A dead black rod, 6 inches high and 3/8 inch in diameter, is placed in a stationary position at the point on the scale marked 1000, and a second rod, identical in size with the first, sliding in a groove which runs the length of the box, may be set at any point on the scale by means of adjustable pulleys. The apparatus is placed directly before and beneath the Snellen charts and illumination is provided for both by one 200 watt daylight Mazda lamp, with an angle reflector installed about four feet above and in front of the test charts.

The applicant is seated six meters from the stationary rod in the apparatus. He is first given the opportunity of seeing the rods in the same plane, then by means of lines attached to the pulleys attempts to bring the adjustable rod in the same plane with the stationary rod, after the rods have been widely separated by the examiner. The test is repeated ten times, the subject's estimations of depth difference being read in millimeters directly from the scale.

Care is taken by the examiner to avoid casting a shadow on the background, and to avoid giving the subject any indication as to whether he is doing poorly or well. In order to prevent motion parallax, the applicant should also be instructed to hold his head

straight. An average depth perception of more than 30 mm. disqualifies the subject.

Depth perception or judgment of distance is important in aviation in the making of landings, where the pilot must accurately judge his distance from the ground, trees, buildings, etc.; in low flying for the same reasons, and in formation flying, where he must keep a safe but short distance from other ships.

Regarding the factors operative in judgment of distance, there are some factors common to both monocular and binocular vision, such as terrestrial association, motion parallax and aerial perspective, which are eliminated under test conditions. Accommodation and convergence can also be eliminated. Captain H. J. Howard, in an article called "A Test for the Judgment of Distance" in the Transactions of the American Ophthalmological Society, 1919, says: "The two remaining factors are the binocular parallax and the size of the retinal image. It is possible to obtain the relative values of these two factors by using the same test apparatus, first with two eyes and then with only one eye. In the first instance both factors may operate together; in the second instance, the binocular parallax is eliminated and only the size of the retinal image can operate. This latter is practically as important a factor with one eye as it is with two. If by comparison it be found on the one hand that the results are the same or approximately the same, it is obvious that the size of the retinal image, which operated in both tests, is the important factor. If, on the other hand, it be found that the binocular test produces a far more delicate discrimination than the monocular, we are forced to the conclusion that the binocular parallax is the more important factor, and the size of the retinal image is negligible or practically so."

Bearing these facts in mind, we turn to the results of the depth perception tests. By averaging the ten readings for the right eye, the individual average for each subject was obtained The same procedure was followed with the readings for the left eye and for both eyes, and these averages were used in the calculations. The depth perception averages (D.P.) of all subjects were found to be as follows:

TABLE I.

100 cases	M (DP)	PEm.	Sigma	C
Right eye	118.30	± 3.92	58.18	.48
Left eye	118.50	± 4.55	67.42	.47
Both eyes	18.65	± 1.57	23.23	1.24
Sighting Eye, (Right, 71 cases; Left, 29 cases)	110.52	±4.19	62.12	.56

The great discrepancy between the average for both eyes and the average for either eye alone will be noted at once. The average judgment with the left eye is more than six times as large as the average for both eyes, and the averages for the right eye and the sighting eye are nearly as large. The mean judgments with the right and left eyes are very close, the average for the sighting eye being slightly better.

The probable error of the mean (PEm) gives the measure of unreliability of the mean, and may be defined as that variation from the average which is as often exceeded as fallen short of. It is that amount which added to or subtracted from the mean gives a range within which 50 per cent of the values will fall.

Sigma is likewise a measure of variability. If on the probability curve a distance equal to sigma is laid off on either side of the mean, and ordinates erected from the base line to the curve, two thirds of the total number of measures will be found to fall in the area between the ordinates, base line and curve. The large sigmas in this case (in one instance as large as half the distance estimated) indicate that the probable error of an individual estimate is large, and that the distribution is scattered—a large number of judgments falling wide of the average.

The variability of the different series of measurements may be directly compared by comparing their coefficients of variability (C). These coefficients indicate that the individual judgments made with the sighting eye and with the left eye are equally variable, and

are more variable than the judgments made with the right eye, while the judgments made with both eyes vary more widely than any of the others.

From a survey of these results it is plain, then, that in spite of the wide individual variations in judgment made with binocular vision, the average is far below that made with monocular vision.

The data were next rearranged according to the degree of visual acuity of the subjects. The average depth perception of those subjects having a visual acuity of 20/20 with each eye was obtained, and also of those subjects having a visual acuity of 20/15 with each eye. A similar average for both right and left eye was made for those subjects with a visual acuity of 20/20 and 20/15 respectively. The results of both groups are presented here for comparison.

TABLE II.

	Cases	M (DP)	PEm	M Dif.	PEd	C
Right Eye.....20/20	29	129.68	± 7.91	27.34	± 6.33	.48
20/15	60	102.34	± 4.74			.53
Left Eye 20/20	18	151.94	±13.70	40.12	±12.78	.55
20/15	64	111.82	± 4.93			.52
Both Eyes 20/20	16	28.11	± 1.96	16.09	± 1.74	.64
20/15	57	12.02	± .90			.83
All Others ...	26	26.92	± 3.81			

One striking fact brought out by this table is that there were approximately three times as many subjects with 20/15 vision, or better, as with 20/20, altho the latter is considered normal. It must be remembered, however, that the great majority examined were young men, the group average being 28.9 years. Those individuals with 20/15 vision were also better in judgments of depth perception than were the subjects having 20/20 vision, altho the variability is about the same for each series of measurements. Particularly in the series for the left eye and for both eyes is this difference noticeable, indicating that the keener the vision, the more accurate would depth perception judgments tend to be. A correlation between these two factors of depth perception and visual acuity gave a result of .457 ± .053, a figure which is more than eight times its probable error and therefore a reliable indication that there is a definite relationship between the two, and that improvement in the former is associated with improvement in the latter. After applying Chauvenet's criterion to eliminate the extreme cases which were not typical of the group, the mean of depth perception was found to be 16.27 ± 1.02, which is lower than the average formerly obtained for all cases, and the mean of visual acuity was 20/15 +1 which is a high average. Inasmuch, then, as more than two-thirds of the subjects possessed a visual acuity considerably above the requirements demanded, it is evident that the degree of visual acuity considered a necessity for fliers is not excessive for the material available.

The fact that one mean is higher than another does not necessarily indicate a true difference between the means. A glance at the table of comparison shows that this difference is considerable, but the degree of reliability of that difference is determined by the size of the probable error of the difference (PEd). To determine a satisfactory degree of reliability, the difference of the means should exceed the probable error of the difference by at least three times, so it is apparent that the probable error of the difference of the means for both eyes (16.09 ± 1.74) is particularly significant, as the difference of the means exceeds it by more than nine times.

The subjects were next divided into two groups; (1) those qualified to fly and (2) those disqualified because of poor visual acuity, low angle of convergence, muscle imbalance, color blindness, etc. The average depth percep-

tion judgments for each group were obtained and they were found to differ widely. The mean in millimeters for the qualified group was 11.93 ± .52 with a coefficient of variability of .54 and the average for the disqualified group was 36.30 ± 5.72 and a coefficient of variability of 1.28. As more than 30 mm. disqualifies in the depth perception test, the size of the latter average is significant. After eliminating one extreme case in this group, the average is still 29.66 mm. The results show that the subject disqualified on any ophthalmologic findings is apt to have a depth perception average near the disqualifying limit and to make erratic judgments varying widely from the normal average. The qualified man, on the contrary, has an aver-

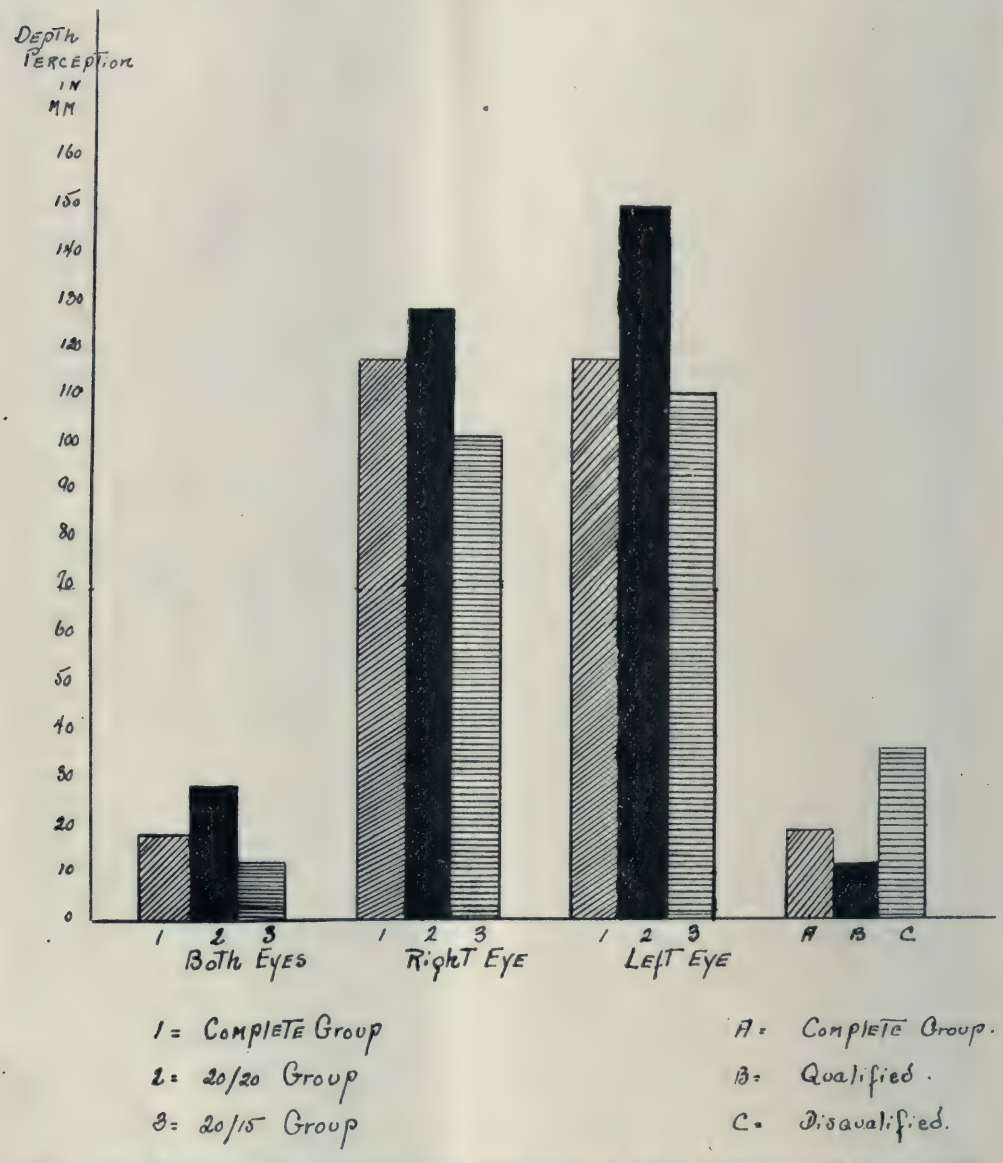

Fig. 1. Graphic representation of results of tests of monocular and binocular judgment of distance. Figures on left indicate distance one rod must be in front of the other for recognition, D P in mm.

age depth perception far better than the standard requirements, and his judgments are more constant and reliable.

Of the thirty disqualified subjects, nine failed to attain the required average of 30 mm. in depth perception, but in only one of the nine cases was the failure of depth perception the sole disqualifying factor. The remaining twenty-one subjects had a qualifying depth perception average but were disqualified for other causes, such as paralysis of the eye muscles, poor visual acuity, more than the allowable amount of hyperphoria or esophoria in conjunction with diplopia, etc. The fact that the mean for all thirty subjects is outside the qualifying limit, and even excluding one extreme case is 29.66 mm., shows that the readings in the majority of cases is very close to the disqualifying mark. The results indicate also that inability to judge depth perception distance with a normal degree of accuracy is quite closely associated with faulty ocular function.

The average angle of convergence for all subjects was found to be 58.9° ± .98, and an attempt was made to discover a possible relationship between this angle of convergence and the diopters of accommodation of the right and left eyes, but as some of the necessary data were lacking in many cases, the results were wholly unreliable. This outcome was not altogether unexpected as the readings were all taken at twenty feet.

A graphic representation of the comparison of the averages of the depth perception judgments of the two groups of subjects, based upon their degree of visual acuity, with the average for the complete group is presented above. The great difference in judgments of depth perception made with binocular and with monocular vision would tend to prove that it is the binocular parallax which is the all important factor in depth perception judgment, and that the size of the retinal image, which operates in monocular vision is of practically negligible importance in judgment of distance. It is plain that for accurate depth perception judgment good binocular vision is necessary, and the results of these tests show that the better the visual acuity, the more exact the depth perception judgment tends to be. As the average—with both eyes—for all subjects both qualified and disqualified is 18.65 mm., it would seem that the standard which designates 30 mm. as a minimum depth perception requirement is not too high. On the contrary, from a consideration of the average for the complete group and for the qualified group, which is 11.93 mm., it is probable that the standard should be raised, and a minimum depth perception average of 25 mm. or 20 mm. should be required.

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OBSERVATIONS CONCERNING THE CAUSATION OF SIMPLE GLAUCOMA.

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This paper explains and upholds the view that simple glaucoma depends upon changes in the vitreous, especially upon swelling of the vitreous body. Such essential condition is not removed by treatment that may give temporary relief from the more prominent symptoms.

Simple glaucoma is an ocular state which results from swelling of the vitreous body. Closure of the Fontanic drainways is no more its cause than is cupping of the optic disc. Both of these pathologic entities are the immediate results of the swelling of the vitreous; each is responsible for its own set of symptoms, which in turn are a part of the complete syndrome. Swelling of the vitreous body is to be compared with swelling of the crystalline lens. Both have the same causes, socalled age changes or an as yet undetermined state of the blood. As in the lens, so in the vitreous, the degree of the swelling is limited by the nature of the body and the processes which produce it. *The actual possible increase in both is small.* Moreover, simple glaucoma is bilateral, and, as a rule, does not appear prior to the time of life when the so-called presbyopic changes have occurred in the crystalline lens. Such is my belief in regard to the nature of simple glaucoma, and the more I reflect upon the problem the clearer its details become.

It was my fortune to have under my care within a few months thirty or more eyes affected with either simple glaucoma, or with simple glaucoma to which was superadded an acute phase. Each case was the cause of much reflection on my part, and as those cases succeeded one another they only served to make clearer the conviction as to the nature of this truly to be dreaded ocular disease. In the discussion to follow, I must admit at the outset that I have no microscopic proof of my belief; nor have I been able to devise a plan by which, with the limited laboratory facilities at my command, I can produce such proof. My deductions were obtained by envisaging each case as it came and by attempting to explain the conditions present in each by one or the other of the many theories which ophthalmology has suggested. When finally I came to the conclusion that swelling of the vitreous body and that this alone is the cause of simple glaucoma, I could not recall that I had ever seen in my medical readings mention of the possibility of such a process affecting the vitreous. Nor have I since seen this mentioned as the cause of the disease under consideration.

Fluidity of the vitreous is a well recognized condition. It varies in degree. It is coexistent with a normal, subnormal or increased intraocular tension, as measured with the tonometer. Its pathology must consist in the disappearance of certain of the vitreous elements and their replacement, in so far as the condition of the ocular tissues, including that of the ciliary processes, will admit, by the aqueous fluid. Increased intraocular tension as the result of increase in the amount of the aqueous within the eye is well recognized e.g. in cases of buphthalmos. Here we have congenital absence of the essential elements of the Fontanic system. This, however, is not simple glaucoma.

I am rather inclined to think that contemplation of the pathology of the congenital type of socalled glaucoma has had much to do with the misappreciation of what goes on in simple glaucoma. These two types of glaucoma are of entirely different pathology. As I see it, the one shows increased intraocular tension with increased volume of retained aqueous as the result of absence of the essentials of the Fontanic channels; the other shows increased intraocular tension primarily as the result of swelling of the elements of the vitreous substance. The higher than normal tension here is increased by

blockage, from pressure of the vitreous, on the exits in the Fontanic system. The increase in the amount of excess aqueous in the anterior chamber is small. The anterior chamber has little tendency to deepen and for two reasons: (1) The aqueous is as incompressible as the vitreous. (2) The ocular envelopes can withstand evenly distributed pressure from within higher than the glaucomatous process develops. (The local exception to this statement is found in the lamina cribrosa).

It has often been noted that simple glaucoma may exist in the presence of either a deep or shallow anterior chamber. The apparently deep anterior chamber is not deep because of the increased amount of aqueous therein. I have never seen a case where the depth of the anterior chamber was greater than is to be seen from time to time in normal eyes. We have been accustomed to expect a shallow anterior chamber in glaucoma of the acute inflammatory type, and when we see a deep chamber in any type of glaucoma it is a matter of mental comment. The shallow chamber in simple glaucoma may be only a normally shallow chamber, or it may represent a relaxation of the suspensory ligament of the lens as the result of the pressure of the vitreous plus sudden inequalities of escape of the aqueous.

In bupthalmos retention of the aqueous results in increase in the size of the whole ball, not only of the anterior chamber—in this disease the aqueous is forced thruout the vitreous substance; the yielding of the ocular tunics is the result of the fact that the tissues of the eyeball lack the resisting properties which later in life they acquire. Increase in size of the vitreous is followed in the course of time by liquefaction of the vitreous. In what does liquefaction of the vitreous consist? In the disappearance of certain essential elements of the vitreous body and their replacement by the secretions from the ciliary processes, i.e., the aqueous.

Why, then, does not the high tension of simple glaucoma disappear after partial liquefaction of the vitreous sets in, if simple glaucoma be due to swelling of the vitreous elements, or, again, if simple glaucoma be due primarily to a swollen vitreous, why cannot a normal or subnormal tension be maintained after removal of a part of the vitreous? I think the answer to these two questions is to be sought in the pressure effects of the swollen vitreous in its enveloping membrane on the channels of exit in the Fontanic angle. The months long, or years long unrelieved pressure results in a proportionate obliteration of these drainways. (An argument for early operative intervention). For a considerable, probably a long time after the processes which result in swelling of the vitreous elements have set in, the discomforts they cause are too vague to be referred by the patient to their proper source. The result is, when the patient comes for examination the oculist is confronted by an old process, one that in every case has resulted in marked obliteration of the ultimate channels of exit, most frequently by cupping of the papilla, in many cases by a varying degree of liquefaction of the vitreous body. Bearing these things in mind, we can see that the success of our operative efforts will be measured by the degree of our success in reopening the closed Fontanic channels.

Thus, for example, in cases where the swelling of the vitreous has never been great enough to cause a tension above 38 or 40, where for the greater part of the time since the glaucomatous process has set in, the tension has remained below 35, where the eyeball is relatively large, where it has never been subjected to unrelieved subacute or acute exacerbations, a large peripheral iridectomy will, as a rule, (even tho the tension be only slightly reduced as a result of the operation) prevent for a long time (I have known it to do so for twelve years) further demonstrable deterioration of the vision or visual field, and this in the presence of a glaucomatous disc. What an iridectomy has accomplished is the removal of a part of the *solid portions* of the intraocular structures. This permits a readjustment of the lines of pressure of the swollen

vitreous and the partial reopening of the as yet not permanently closed channels of exit.

Where, however, the swelling of the vitreous is so great as to result in a very high intraocular tension, and this has persisted so long as to permanently glue together the minute channels of exit, an iridectomy, no matter how well executed or how large, will fail to permanently reduce the tension. With these facts in mind we can see why in one case an iridectomy fails and in another is a success.

In considering what takes place when the vitreous body swells, we must bear in mind the impermeability of its limiting membrane; witness, for example, the picture seen in thrombosis of the central retinal vein or its major branches. Here in spite of marked local retinal edema, with excessive bending of the venous branches and the concurrent hemorrhages, we find no edema or blood in the vitreous. There is nothing in the clinical pictures or histories of the well known inflammatory conditions affecting the cilio-corneal region which lends itself to the belief that simple glaucoma is of inflammatory origin. Where in acute iridocyclitis, as is occasionally the case, the intraocular tension rises above the normal, there are pain or redness and external and internal visible conditions which are never seen in uncomplicated simple glaucoma. In simple glaucoma, for a long time after the process sets in, there is no visible trace of external congestion of the sclera or conjunctiva about the corneal ring; the pupil reacts normally; the range of accommodation is not demonstrably lessened; the vision remains normal; the field of vision remains uncontracted; indeed, were there not means of detecting the existence of a higher than normal intraocular tension, we should be left with the indefinite nervous symptoms, including headache and aching of the eyeballs which follow attempts to use the eyes for close work, as the only symptoms we could detect. In this stage of the disease, we are faced with a problem whose only symptoms are noninflammatory rise of intraocular tension and eyestrain. The eyestrain is manifestly the result of the increased tension; therefore we have to seek a cause for only one thing, viz., increased tension. This must come from one of two causes, increase in size of the vitreous body or noninflammatory closure of the Fontanic exits.

Now, whatever our hypothesis may be, it must have as its basis a terminal condition, for primary glaucoma having once been established continues thru life. It is an incurable as are the age changes in the crystalline lens. It cannot originate in loss of function of the iris or ciliary movements, or atrophy of the ciliary glandular elements, for these continue to function until atrophic degeneration from pressure sets in. I know of nothing which would properly suggest paralysis or disturbance of the sympathetic control of the cilio-glandular system as a possible cause. Section of the sympathetic does not result in primary glaucoma. Swelling of the lens cannot be the cause, for simple glaucoma occurs and may last a long time without any demonstrable refractive changes. As far as I can see it then, we must look for changes in the vitreous body as the cause of simple glaucoma.

That the crystalline lens swells or diminishes in size as the result of what we term age changes is well known. That the vitreous body tends in old age to develop changes which result in fluidity is also a well recognized chapter of its life history. That a possibility exists that it may undergo changes which result in its general enlargement from swelling of its essential elements must at least be admitted. That these changes may be followed later by atrophy of the hypertrophied or swollen elements with a resultant liquefaction of the vitreous is highly probable. That changes similar to those which occur in simple glaucoma take place in the vitreous of all eyes in the later years of life is to be admitted. The degree of these changes determine the presence or absence of simple glaucoma. That other causes than age changes may result in swelling of the vitreous elements is probable, but

whether this be the result of certain endocrin insufficiencies or of toxins in the blood, I cannot say. Probably the former is the correct answer.

If then we grant that swelling of the elements of the vitreous body is a pathologic possibility, we have a solution of the cause of simple glaucoma. In reading what is now immediately to follow, we must bear in mind that we have confined our comments entirely to those stages of simple glaucoma which precede the irritative or inflammatory complications, for these latter are rendered possible as a result following the pressure of the enlarged vitreous, and are in no sense responsible for the primary swelling of the vitreous. The pressure of the swollen vitreous is exerted equally in all directions. Its pressure posteriorly results in forcing backwards of the lamina cribrosa with a resultant cupping of the disc, which in turn forces against the edge of the cup the retinal fibers and their blood vessels. As a result of this we have (1) atrophy of the retinal fibers with changes in the visual field; (2) compression of the arteries and veins, which produces circulatory disturbances in the retinal vessels, which are especially noteworthy where, as often is the case, these vessels are the seat of sclerotic changes. The lateral pressure of the swollen vitreous is most noticeable when it is sufficiently high to obstruct wholly or partially the exits of the venae vorticosae, and is then represented visibly by the dilatation of the middle episcleral veins. Closure of the exits of the venae vorticosae in itself is followed by increased intraocular tension, but where this occurs as the result of swelling of the vitreous we must bear in mind that the simple glaucomatous condition is not the result of the obstruction of the exits of the venae vorticosae but of swelling of the vitreous itself. The anterolateral pressure is exerted against the Fontanic area, i.e., the sclerocorneal region. This produces flattening of the ciliary processes and proportionate closing of the channels in the Fontanic system, with a forcing forwards and outwards of the root of the iris.

That the closure of the ultimate channels of exit for the aqueous is *for a long time* not the result of the presence of fibrinous deposit therein, but is solely the result of pressure, is proven by the fact that the use of eserin is so often capable of producing a marked reduction of the intraocular tension. Were the channels blocked with a fibrinous deposit, eserin could produce no such result. (Here we have a test which will help us to decide for or against the use of iridectomy in many cases.) Where the pressure of the swollen vitreous has been great (for the degree of swelling of the vitreous varies in different eyes) and has lasted for a considerable time, the result is permanent closure of so great a proportion of the Fontanic channels of exit, that the use of eserin does not reduce the intraocular tension, nor will iridectomy afford relief. Again, there is clinical evidence that sclerocorneal trephining is often followed by a gradual opening of a part of the closed channels of exit. This is to be expected. Lastly we have the picture presented in simple glaucoma in those cases where in the presence of high tension the lamina has not yet given way. The pressure of the vitreous against the retina produces an amblyopia without any contraction of the visual fields. Here at first the amblyopia is transient, lasting for periods of varying duration, and recurring at intervals of different length. I have seen in one case, notable among the cases under my care, the vision increase from 18/200 to 18/15 in a few moments after the instillation of eserin.

A few words must be added about the irritative and inflammatory stages of simple glaucoma, and I think much of the confusion which exists in regard to the causation of this disease is due to the fact that these complications have not always been clearly recognized as one of the results of the increased intraocular pressure, as much so as cupping of the disc or blockage of the Fontanic channels. In our treatment of simple glaucoma we must bear clearly in mind that doing away with the ir-

ritative or inflammatory symptoms does not cure the disease. In the presence of the pressure exerted by the swollen vitreous against the cilio-iridic region, the ciliary muscle readily tires (witness the easily produced eyestrain of the simple glaucomatous eye). This functional exhaustion disposes the ciliary region to active congestion, if the blood contains an undue proportion of toxins from foci of infection. This congestion may be slight or severe and hence the irritative or the socalled inflammatory types. *Removal of the foci of infection, if done in time, is followed by disappearance of the irritative or inflammatory stage, but the process known as simple glaucoma remains present as before.* We have in the above the explanation of the socalled cures of acute glaucoma following extraction of a tooth, or opening and draining of a nasal air chamber, which from time to time have been reported in medical literature.

CLINICAL OBSERVATIONS ON INCREASED INTRAOCULAR TENSION.

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The differentiation between glaucoma and uveitis with increased intraocular tension is sometimes very difficult, altho text-books fail to point this out. This paper reports a series of cases in which the tension was reduced to normal and permanent cure secured by the use of mydriatics. Read before the Chicago Ophthalmological Society, February 20, 1922. See p. 379.

It is not the intention of this paper to open a general discussion on the subject of glaucoma, but to review a study of the following cases which will illustrate the difficulty frequently encountered in differentiating some of the cases of uveal inflammation which come under observation from cases of primary glaucoma. If we read either a modern text-book on ophthalmology, or one published twenty years ago, the conclusion arrived at will be that the two conditions—iridocyclitis and glaucoma—have well marked differential points, which enable one to make a diagnosis at once. Yet this is a question which often gives not only the student but also the trained ophthalmologist the most concern in practice. Time and again this question presents itself, and we are all called upon to make a decision which is difficult as well as extremely important.

Classical cases are, of course, readily recognized, but the atypical cases are the difficult as well as the interesting ones. We are all aware that every eye which has increased intraocular tension is not affected with glaucoma, and we should keep this fact firmly fixed in our minds, since it often happens that increased hardness of the eyeball is such an outstanding feature in the case under observation that it seems to engage our entire attention, even to the exclusion of all other symptoms, and primary glaucoma is our first and only thought; and following on in this direction miotic treatment is at once resorted to, sometimes with disasterous results, whereas mydriatic treatment would have saved the day. The following cases are illustrative of this point and are submitted for that purpose.

Case 1. Many years ago a young man 22 years of age came under my observation, who had been suffering with severe pain in the left eye for a number of days. The pain was so severe when I first saw him that he was nauseated and had been vomiting most of the time during the previous days. I found his pupil partly dilated, the anterior chamber practically obliterated, eyeball hard, and the lens somewhat opaque. He had been struck on the eye by the ramrod of a toy pistol about twelve days previously. There was apparently no rupture of the anterior capsule of the lens and no lens matter could be seen in the anterior chamber.

I reasoned that the capsule had been ruptured posteriorly and that the lens swelling had pushed the iris forward.

and obliterated the sinus angle, and since his lens had not attained its complete growth at 22 years of age, I would attempt complete dilatation with atropin, and if that could be accomplished it would restore drainage from the posterior to the anterior chamber and probably open up the sinus angle.

I accordingly began with alternate instillations of cocain and atropin, and within four or five hours his tension and pain were relieved and he ran the usual course of a case of traumatic cataract, except that there never was any lens matter in the anterior chamber at any time, absorption taking place posteriorly until there was nothing but a capsule remaining. This was my first experience of this kind and I was very much impressed with the fact that altho the swollen lens was not removed, the hypertension was relieved immediately and permanently by the use of atropin.

Case 2. In the spring of 1898 a man of 35 years came to me with a well marked iridocyclitis. He had a history of lues and many corroborative symptoms of the disease. He was put on atropin and specific medication and made very satisfactory progress for about three weeks, pupil dilated readily and evenly and his pain was relieved. Then the eye suddenly became painful anl tender and the tension became +. Leeching was resorted to, but without relief of either pain or tension. Atropin was suspended and the pupil rapidly contracted; at the same time the anterior chamber became deeper than previously, the aqueous became cloudy and the tension and pain increased. Atropin was resumed with some improvement in the tension and was pushed vigorously; the pupil dilated rather surprisingly and there appeared to be no adhesions whatever, but numerous fine precipitates on the lens and posterior surface of the cornea. A paracentesis was done with almost magic relief, tension remaining down and recovery promptly taking place. Evidently a case of what we used to call serous iritis, the turbid aqueous being the probable cause of the hypertension.

Case 3. A babe of 2 1/2 years brought with congenital cataract in both eyes. Right eye needled and three weeks later left eye needled. Eight or ten weeks later right eye needled again with rapid absorption of lens matter for a number of weeks, then pupil became difficult to keep dilated and later tension became elevated and the eye became red and painful. At this time the anterior chamber was quite shallow, tho there seemed to be nothing but capsule remaining. A capsular discission was made on the theory that the iris was adherent to the capsule and chamber communication shut off. No relief was afforded by the opening thru the capsule and two days later an iridectomy was done. A very free gush of aqueous followed the abscission of the iris, and relief was prompt and permanent.

Here apparently the aqueous was secreted into a closed pocket formed by the iris anteriorly, the thickened lens capsule and zonule posteriorly and nearly or quite surrounding the pupil. After the iridectomy the pupil dilated readily with atropin and a good result was secured. The above cases antedate the tonometer, thus tonometer records were not made.

Case 4. Mrs. M. S., age 43. Came complaining of blurred vision in left eye for previous week, with occasional severe pain above the eye; had similar trouble sixteen or seventeen years ago. R.V.=20/25, L.V.=20/100; L. eye congested, anterior scleral vessels much distended and pupil slightly dilated; reaction to light sluggish, anterior chamber deep, T decidedly +, media clear and fundus normal. R. field normal, left field contracted 20° in nasal portion; with tonometer T.=75. Such high tension with pupillary reaction was so unusual that I secured another tonometer, thinking my instrument might be at fault, and on restoring found T=75, the same as with my own Gradle tonometer. Arterial pulsation was not present, but could be produced by pressure on the globe. There was a small posterior synchia below, which the patient stated had been present since the first attack of the trouble.

On account of the deep anterior chamber I decided to carefully use a mydriatic and accordingly applied five instillations of 2% homatropin with two instillations of 4% cocain. At the end of ninety minutes the pupil was dilated widely, and T. was reduced to 60, a drop of 15 mm. A careful examination of the cornea, lens and media showed them to be entirely free from exudates. Scopolamin hyd. brom. grs. 1 to ℥i was ordered every two hours, a leech was applied to the temple and a course of calomel and saline was given. The next day T.=50, less pain and blurring, and in four days tension was 24, with vision 20/30, and entire freedom from pain. The tension remained at this point for one week when it decreased farther recording 10 mm. with the same tonometer. About this time a few deposits appeared on the lens and in the vitreous, but none could be seen on the posterior surface of the cornea. This patient had a ++++ Wassermann and a number of dead teeth with apical infection. But she had practically recovered from her eye condition before any of the teeth were extracted. She had been given about eight or ten rubs of ung. hydrarg. up to this time. The eye remained well and she had her bad teeth removed as well as continuing her treatment for lues. When last seen by me, which was about nine weeks after the onset of her trouble, her vision was 20/25, T.=18 to 20 and field of vision normal.

Case 5. Mr. R., age 24. Came with a history of loss of vision in his left eye dating back about two months. The eye showed evidence of inflammation and was quite painful at times; the anterior chamber was shallow, pupil was contracted, and there were a few deposits on the posterior surface of the cornea, at from five to seven o'clock. A distinct circumcorneal injection was present and tension was 54 mm.

This patient had in his possession a 2% sol. of pilocarpin, and 5% sol. of dionin, which had been ordered by a local ophthalmologist. Vision was light and shadows only, and fundus could not be seen on account of the contracted pupil and the great number of vitreous opacities which were present. A diagnosis of uveitis was readily made and the use of a mydriatic was determined upon. Accordingly homatropin 2% was ordered for instillation every hour, the patient was leeched and put to bed.

I saw him again in the evening and found the pupil fairly well dilated and the tension somewhat reduced. Scopolamin was substituted for homatropin and the next day tension had dropped to 42; scopolamin was continued for another 24 hours and was then replaced by atropin, the tension having dropped to 30. In the meantime a blood Wassermann showed negative, and a badly diseased pair of tonsils were found as the only apparent cause of the trouble. These were removed and a rapid recovery from the acute process followed, leaving only the results of inflammatory exudation, which slowly disappeared with the exception of the vitreous opacities, but with no return of the hypertension. When last seen vision =20/65 with —.75 sphere. This was about three months after his first visit to me. There were quite a few floaters remaining in the vitreous at this time. Two and a half years later this patient had vision of 20/25 with —1.25⌒—.75 ax. 165. No vitreous opacities present.

From a study of these cases it will be seen that the anterior chamber may be either shallow or deep, depending on the pathology present. If the lens or lens capsule is involved, or if there is posterior or peripheral anterior synechia the chamber will appear shallow. This is particularly true if the disease has been present for some time before proper mydriatic treatment has been instituted, or if it has been difficult to obtain proper absorption of the drug; while the chamber is usually deep in the earlier stages of the disease, which condition is probably due to the freedom of communication between posterior and anterior chambers, which exists at this time, and an increase in the albuminous contents of the aqueous, which varies considerably in different cases.

The pupil may be dilated to some extent, as in cases one and five, but is most often dilated in the cases where the anterior chamber is deep, and in which the tension seems to be due to the increased viscosity of the aqueous; while a contracted pupil is usually present along with a shallow anterior chamber and the hypertension is due to the crowding forward of the iris and evident blocking of the sinus angle.

Just what influence swelling of the ciliary body has on the production of tension in these cases, is somewhat difficult to determine, tho tenderness in the ciliary region is often most pronounced in the cases which later develop minus tension.

In attempting to isolate the cases in which mydriatic treatment may be logically and safely applied in the presence of + tension, one must take into consideration the following points:

1. The age of the patient (young and middle aged individuals being in the majority, while primary glaucoma is peculiar to advanced age).

2. The history of the case, which includes the absence of prodromal symptoms, which, according to Weeks, are present in about 75% of the cases of acute glaucoma.

3. The involvement of one eye only, while primary glaucoma most often affects both eyes.

4. The lack of corneal haziness and anesthesia, but the presence of either cloudy aqueous or other distinct evidence of exudation.

5. In the majority of cases a deep anterior chamber.

Of course, ciliary tenderness and other common evidences of iridocyclitis must be taken into account.

In closing I cannot refrain from observing that while some of these cases may require iridectomy for their relief (e. g. eyes that have annular posterior synechia, or anterior peripheral synechia), I am firmly convinced that some of the cases of so called acute primary glaucoma which are cured by iridectomy belong to this class, which if treated early and vigorously with mydriatics would have made an equally good recovery.

THE ANGLE ALPHA.

E. Landolt, M.D.

PARIS, FRANCE.

This article explains and defends the earlier attempts of its writer to make more definite the understanding of the angle alpha and the factors that influence the apparent diviation of the cornea from its normal position.

In the report of the Committee on "Collective Investigation Concerning the Ocular Muscles" to the Section on Ophthalmology of the American Medical Association, I have just read (p. 277 Presession Volume) the following statement:

"From the earliest days of ophthalmology we have been taught that except in low degree of myopia, the optic axis AA′ meets the visual axis OF at an angle AXO, which angle has long been known as the angle alpha. . . . Unfortunately Landolt did not follow the example of Donders in calling the angle made by the optic with the visual axis the angle alpha. Instead he gave the name to the angle OXE. The result was that the later writers . . . have tried to clear up this confusion by referring to the "angle alpha of Donders" as one, and the "angle alpha of Landolt as another angle."

The diagram explaining this assertion happens to be taken from my work: "The Refraction and Accommodation of the Eye," Fig. 52, p. 117. I reproduce it here with its original foot note.

It is self evident that the text in my book gives full and clear explanation of these points, lines, angles, etc. Moreover, at the foot of the page I have quoted passages from the works of Donders, Helmholtz and others, from

whose writings I drew my descriptions.

First of all, I state that the writers of this article have not even understood my figure or my explanations. The fact is the optic axis AA′ meets the

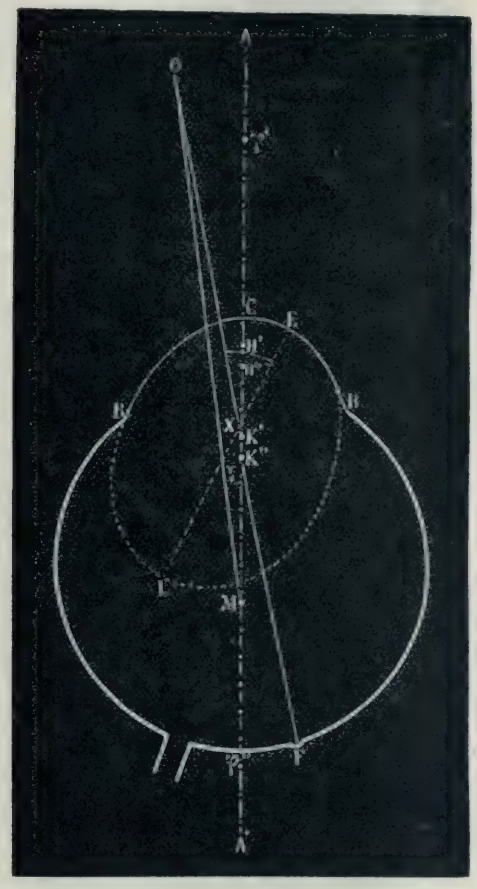

Fig. 1. The figure is made very schematic, in order that the angles α and γ may be rendered more apparent. A A′, optic axis; ϕ', anterior focus; ϕ'', posterior focus; H′ H″, principal points; K′ K″, nodal points; M, centre of rotation; C, centre of the cornea; B B, base of the cornea; E L, major axis of the corneal ellipsoid; F, *fovea centralis;* O, point of fixation; K′ O, line of vision; M O, line of fixation; O X E, angle α; O M A, angle γ.

visual axis OF not in the point X. This point is situated on the major axis of the corneal ellipsoid, whereas, as I say: "The line of vision has no common point with the optic axis, only the nodal points K′ and K."

According to their definition the angle alpha would therefore be AK′O (and not AXO). But what is Donders' definition of the angle in question? Is it the angle between the optic axis and the visual axis?

Let us look at his classical work published in 1864 by the Sydenham Society. Page 182 he says: "The angle between the axis of the cornea and the visual line," the same on pages 297 and 299, everywhere it is a question only of the relation between the *corneal axis and the visual line.*

Let us also consult Helmholtz "Physiologic Optics." In the first edition 1862, p. 8, he says: "Senff calls alpha the angle between the summit of the ellipsoid (of the cornea) and the endpoint of the axis of the eye." Helmholtz adds: "Senff means probably by 'axis of the eye,' what we shall define later as 'visual line.'"

In fact on page 11 Helmholtz says: "The angle between the major axis (of the corneal ellipsoid) and the visual line."

The same definition is to be found in the second edition of Helmholtz on page 18, and in the third edition on page 12. Everywhere the angle alpha is defined as the angle between the axis of the cornea (and not that between the optical axis of the eye) and the visual line.

All those who know of Donders and Helmholtz more than their names, know this; they moreover understand the importance in the research of the dioptric system of the eye of the angle formed by the major axis of the corneal ellipsoid and the visual line.

An analogous importance belongs to the gamma in the investigations of the rotation of the eyeball.

It is true that the interest attached to these two angles is rather of a purely scientific nature. I would not say, however, with Savage (Ophth. Rec. 1909, v. 18, p. 546) "that the sooner these angles are forgotten the better." One cannot forget what one has never known; but at least it would seem proper not to speak of things which one does not know.

Descending from the scientific spheres to the domains of ordinary practice, I suppose that savants of the earlier days of ophthalmology have perhaps meant to speak of an angle which not infrequently

produces *apparent strabismus*, that is to say *the angle between the direction that an eye has in reality*, and the *direction it appears to have*.

The first of these two directions is the *visual line*, which unites the point fixal with the center of the fovea. The second is the *axis of the pupil;* for it is on the pupil that one sees (and not on the summit of the corneal ellipsoid, or on the optic axis of the eye which one *does not see*) that is based the apparent direction of an eye. (Think of how we judge the direction of the eyes in a portrait.)

It is this angle and not the angle alpha that in practice we easily determine by the perimeter. (See Norris and Oliver's System of Diseases of the Eye, v. 4, p. 46.) It produces an apparent divergent strabismus when the pupillary axis passes outside (on the temporal side) of the visual line; or an apparent convergent strabismus when the pupillary axis passes to the inner (nasal) side of the visual line. I have given this angle the name of kappa. But I entirely disclaim the paternity of an angle alpha. There is only one angle alpha, i. e., the one of all those we have made a study of the dioptric system of the eye, and which is explained in the pages quoted from my work.

ERRORS IN OPHTHALMIC LITERATURE.

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A number of the errors that are frequently repeated in ophthalmic literature are here pointed out and made the basis of a plea for more careful study of what has been published in the past, before putting forward ideas as new.

Somewhere, in his voluminous writings, Kipling has this virile couplet:

"The sins ye do, two by two,
Ye pay for, one by one."

The sins (errors) of ophthalmic writers do not run "two by two," and are not paid for.

Trifling as they may appear to be, they are not necessary, and they should be eliminated. The short cut to authorship tends to perpetuate errors which could be avoided if the literature were carefully studied. Precision and exactness are the watch dogs of ophthalmology—of its literature, as well as of its practical application to the diagnosis and treatment of disease.

In delving into the literature while preparing the manuscript for a new edition of a text-book, the writer has had two thoughts come to his mind:

1. The ancient is always old, but the *new* not always of recent origin; and,

2. Errors, as regards dates, facts, the spelling of names, the citation of references, etc., are handed down from one generation of ophthalmologists to another, without question.

The writer has not the time to elucidate, nor would it be advisable to consume the space in this JOURNAL to verify, the reasons for the *ex cathedra* statements which follow:

A. CONCERNING THE CILIARY MUSCLE.—In 1846, Ernst Wilhelm Brücke (1818-1892) described the ciliary muscle ("Ein neuer Muskel im Auge." *Med. Zeitung, Berlin,* 1846, XXV, 130). Probably he did not know that the muscular nature of this part of the eye, which had been suspected since the time of Eustachius (1520-1547), was first demonstrated microscopically, in 1835, by an American, William Clay Wallace of New York, who revived the name *ciliary muscle* which Eustachius had given to it(*Am J'l. of Sciences and Arts, 1835, XXVII, 219-222*). Even the deeper circular fibers were first mentioned by Wallace, altho the honor of their discovery is often credited to H. Müller.

B. ZEISS versus ZEIS.—Some years ago the writer called the attention of Professor Piersol to the fact that the sebaceous follicles lubricating the cilia, belong to *Zeis*, not *Zeiss*. Edouard

Zeis, of Dresden, in 1835, in von Ammon's *Zeitschrift für Ophthalmologie,* described these structures. Up to date, all books on anatomy and ophthalmology, with two or three exceptions, perpetuate the misspelling.

C. Douglas Argyll Robertson (1837-1909.)—Argyll-Robertson, so far as can be ascertained, never lived. He is a myth. The pupillary sign, which is found so frequently in tabes, should be called, "the Robertson symptom." The hyphen is out of place.

D. Saemisch's Incision, which is mentioned in all ophthalmic text-books as of value in the treatment of ulcus serpens, was described, practiced, and published by G. J. Guthrie, in 1843—twenty-seven years before Saemisch wrote on the subject.

E. Galezowski Redivivus.—The iris knife to which our instrument makers attach Dean's name, is described on page 443, and is pictured on page 444, of Galezowski's *Traité des maladies des yeux, troisième édition,* Paris, 1888.

F. Iridotasis—Borthen, or Critchett.—Iris-inclusion operations for glaucoma, regardless of the danger of causing sympathetic ophthalmitis, seem to be attaining popularity. Except as concerns minor details, the writer fails to find wherein the procedure of Borthen (1909) differs from the operation which George Critchett, in 1857, performed in four cases of acute glaucoma. (*Royal London Ophthalmic Hospital Reports, vol. 1.*)

G. Corneo-Scleral Trephining for Glaucoma.—While his admirers attribute this procedure to Lieutenant-Colonel Elliot, doubtless that gentleman, if he could be heard, would give a different version of the origin of the operation.

Argyll Robertson—without the hyphen—in 1876, took Bowman's corneal trephine, added a roughened handle and a guard to limit its penetration, and trephined the sclera; later, he made a conjunctival flap and moved the instrument forward, so as to engage the corneosclera; and predicted, that the operation would give "an effectual means of reducing intra-ocular tension." (*Royal London Ophthalmic Hospital Reports, vol. VIII, part 3, May, 1876.*)

H. Use of the Cautery in Ulcers of the Cornea.—The surgeons of ancient and medieval days applied the cautery to all sorts of diseases. The use of the actual cautery in infected ulcers of the cornea belongs, not, as often has been stated, to Gayet of Lyons, but to our own Martinache, of San Francisco (*Pacific Medical and Surgical Journal,* November, 1873).

In his work on *Ophthalmic Surgery,* the late Charles H. Beard, of Chicago, said:

"Since the year 1873, when Martinache, of San Francisco, first called attention to its virtues in the treatment of *ulcers of the cornea,* the cautery has come to be a standard remedy for all such infectious diseases as serpent, fascicular, annular, dendritic and rodent ulcers, ulcerated wounds, and the ulceration incident to purulent ophthalmia."

I. Enucleation of the Eyeball.—The modern method of enucleating the eyeball, whereby there shall be the least sacrifice of other tissues without disturbance of Tenon's capsule, is credited by various ophthalmic writers to Bonnet, of Lyons, and to "Ferrall," of Dublin. As a matter of fact, the credit belongs to the Irishman, J. M. O'Ferrall (*Dublin Medical Journal,* 1841.).

J. Cyclicotomy.—At almost regular periods we are asked to consider a "new" operation for glaucoma, whereby the ciliary muscle is severed along with more or less adjacent tissue. Henry Hancock (1809-1880), in 1860, wrote "On the division of the ciliary muscle in glaucoma," and covered the subject thoroly.

K. Paracentesis in Corneal Ulcer.—In 1904, in advocating paracentesis of the cornea in cases of ulcer in which perforation seemed to be imminent, the writer said:

"If paracentesis is indicated in corneal ulcer, the opening should be made not thru the floor of the ulcer, as is usually advised, but, with care, a paracentesis can usually be made thru normal tissue, and infection should not follow." (*Modern Ophthalmology,* page 355).

Only recently did the writer learn that precisely the same advice had been given by Alfred von Graefe, in 1872.

L. Suction Operations for Cataract.—The intracapsular extraction of cataract by means of a suction apparatus is now in the limelight; and not infrequently is credited to Barraquer, an eminent ophthalmic surgeon of Barcelona. While Barraquer has greatly improved the suction apparatus, and has employed it in more than one thousand extractions, the method belongs to an American. In 1910, Dr. Vard H. Hulen, then of Houston, Texas, now of San Francisco, reported six successful intracapsular extractions by the suction method (*Ophthalmic Record*, December, 1910). Barraquer published his first paper on this subject in 1917. It is to be hoped that the suction operation will not have have to be thrown into the discard, because of loss of vitreous humor and detachment of the retina.

M. Hyperopia versus Hypermetropia.—Perhaps it is unnecessary to state that *hyperopia* (oversight), which seems to be firmly entrenched in our literature, is a less expressive word than *hypermetropia* (over-measure-of-sight); and that *chorioid* should be preferred to *choroid*. The dislocability of the English language is astounding.

Many other examples, like those which have been mentioned, might be cited of the errors which have crept into the literature of ophthalmology. However, it is not the writer's desire, to compile a complete list of "errors;" but, to command the attention of the reader, so that more careful study may be given to the preparation of the ophthalmic literature of the future.

In many respects we Americans are like the ancient Athenians whom Pericles addressed; and whose fateful Peloponnesian War was described, in masterful language, by Thucydides. We are new; often we are erratic; we are easily changed from positivism to negation; we are unduly sensitive; and most of us take ourselves too seriously. Doubtless we will improve with age. However, in spite of our defects, we still remain the one best hope of the world. Let us so conduct ourselves as to deserve the high position which the fortunes of war have cast in our direction.

In place of wildly striving to produce some modification in an operative procedure to which our names may be attached, the most of us might better serve our profession by a careful study of the writings of such dead giants as Donders, Snellen, Bowman, Helmholtz, Hutchinson, Liebreich, Bader, Hancock, Panas, Galezowski, Mackenzie, Critchett, and many others. One of the serious errors in our present-day ophthalmic literature is the ignorance, which many writers display, of the work which was done by those who have passed. Many hours would be saved, much useless experimentation would not be undertaken, and not a few hopes which are foreordained to end in bitter disappointment would be avoided, if the present generation only were wise enough to learn the history of the profession.

One of the pathetic things of life is this: that it seems to be impossible for the son to take up the burden at the point where the father, in the weariness of years, has laid it down. If the work of the masters were known, we would hear less of new operations and new discoveries.

The writer will now bring this paper to a close, by quoting what Elliot said five years ago, *in re* glaucoma:

"Those who have read, or who will read, patiently what von Graefe, de Wecker, Bowman, and many another giant of the past had to say on the clinical side of the subject, are bound to rise from their task in a chastened and humble frame of mind." (*Ophthalmoscope*, 1916, page 510).

EYE GLASSES VERSUS SPECTACLES.

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MASON CITY, IOWA.

It is here argued, that with care to have them well fitted and kept in proper position, eye glass frames may be used with the same advantage as spectacles. If not kept in proper shape either will give unsatisfactory results.

Dr. Geo. M. Gould's article in American Medicine on eyestrain is in many respects timely. His warning that glasses should be kept polished, and that lenses prescribed for the relief of eyestrain should not be ordered in frames where there is danger that the lenses will not remain correctly placed, is logical. Indeed no competent oculist would prescribe eye glasses for a patient whose occupation exposes him to strong currents of air, or for one whose nose is not properly shaped to hold them securely, no matter what his occupation might be.

However, his denunciation of all eye glasses is too sweeping, for while there are many who, because of their vocation or shape of nose, should not wear them, there are thousands who can and do wear them and with greater comfort than spectacles. It is by no means true that spectacles always hold lenses before the eyes better than eye glasses do. Let anyone for a day observe the disarranged eye glasses and spectacles worn by those he chances to meet and it will be unusual if he does not see more spectacles with one glass cocked higher than the other, than eye glasses improperly worn.

There are reasons why eye glasses on many stay in place better than spectacles do. The frame of an eye glass will give and become displaced on the nose when accidently struck, and is not as easily bent as the spectacle frame. Eye glasses need only to be replaced on the nose but the adjustment of the bent spectacle frame is not so easily dealt with; and they may be worn for months with or without the patient's knowledge, and in any event the finding of an operator who will skillfully adjust them is a matter of more or less inconvenience. Any attempt the wearer may make to remedy his mishap will invariably result in its being made worse than before.

There are those who could wear eye glasses as well as spectacles but because of their sensitiveness to the pressure on the sides of the nose, will not wear them, and a like condition is found among many who should wear spectacles. They are made so uncomfortable by the temples that hook over the ears that they refuse to be so annoyed when an eye glass could be comfortably worn.

Eye glasses are more easily put on and off than are spectacles, which is important to those who must remove their glasses frequently. From the former a chain may be attached to the clothing, but spectacles must be carried in a case, which is inconvenient, especially for women.

In this northern part of the country, during the winter months, the cold lenses immediately steam over when a warm room is entered, which necessitates their removal, and for this both hands are usually used, which also is a disadvantage. This occurs at a most inconvenient time and is particularly embarrassing to women who must disarrange their hair by the process. This trouble with spectacles would not be of great importance if this procedure were necessary to preserve the eyesight and health, and would be more gracefully endured if the sweeping condemnation of the eye glass as made by Dr. Gould were justified.

The many eminent oculists who wear eye glasses themselves and who prescribe them for their patients is evidence that they do not subscribe to the severe indictment of the eye glass. Dr. Gould's high standing and long and useful service to the medical world gives importance to any words his hand may pen, tho we presume he lays no

claim to infallibility. It is my opinion that many will be unnecessarily inconvenienced by his expressed prejudice against the eye glass, and that his opinion should not go unchallenged.

Fig. 1. Correctly adjusted modern eye glass, comfortable and stays in place.

Fig. 2. Spectacles as they should not be but frequently are worn.

His criticism would be timely were we using the make of eye glass frame manufactured fifteen and twenty years ago. But those in common use today are made with stiff guards which hold the lenses firmly in place and their use is of great comfort to thousands. Even the hoop spring is worn comfortably by many where spherical lenses are prescribed. The manufacturers of eye glass mountings have for years been vying with one another to overcome all possible objections to them, and they have succeeded in a remarkable degree.

Dr. Gould's warning voice has the earnest ring of the sacred prophets but has a grave sepulchral tone; it tells us of a grievous fault of yesterday, of a danger that is largely past and is not our own.

GLIOMA OF THE RETINA.

M. J. KEYS, M.D..

VICTORIA, B. C., CANADA.

This is the report of a case which is made the basis of a general review of the subject. Read before the Pacific Coast Oto-Ophthalmological Society, Seattle, July, 1921.

True glioma of the retina is seen so rarely and the subject is so interesting, that it warrants publication of the details of every case observed.

The following case recently occurred in my own practice:

CASE HISTORY.

J. D., female, was born in the Jubilee Hospital, Victoria, two and a half years ago. She is the only child in the family. Mother pregnant but once. Parents: father, English; his mother was Scotch. The mother of the child is English, born in Lancashire; no history of any similar eye trouble on either side of the house. The little patient when born was a healthy baby, labor was normal, and she has never had a day's illness in her life, not even the diseases common to childhood, and when first seen by me September 28th, 1920, was a well nourished, healthy appearing child.

About two weeks previously, a lady, one of the neighbors, drew the attention of the mother to the peculiar appearance of the child's right eye, and about the same time the child's cousin, a lad of 12 years of age, noticed the same thing, and curiously enough, remarked that it looked like a "cat's eye in the dark." The parents then began to study the eye and noticed in looking at this eye from the temporal side, that it had a peculiar white appearance in its interior. On September 28th, the child was brought to my office for examination, with the history as given above.

Examination. Tension of the right eye increased, lids and conjunctiva normal, cornea clear, no signs of posterior synechia or cyclitis or keratitis punctata, the pupil slightly dilated and fixed. In looking at the eye from the temporal side, the white appearance of the interior was quite apparent. The pupil was further dilated with homatropin and cocain, and the ophthalmoscopic examination revealed the media clear, but a tumor mass could be seen springing from the lower nasal side of the fundus and projecting forward. No blood vessels were apparent on the growth, which presented an appearance very like absorbent cotton. The temporal side of the retina had the usual red reflex, but towards the growth this diminished, and approaching the growth the reflex was lost. No effort was made to test the vision in this eye. Vision in the left eye normal and has remained so.

Diagnosis. I concluded from the history and examination, particularly the absence of any trauma or sickness of any kind, that I had to deal with a glioma, keeping in mind the possibility of a pseudoglioma. I explained the seriousness of the condition to the mother and advised immediate enucleation. Dr. Scott-Moncrieff of the city of Victoria, saw the case and agreed with the diagnosis and concurred in the treatment. The parents consented at once to the removal of the eye.

Operation. On September 30th, the eye was removed in the usual way with this exception: after the muscles were severed, the optic nerve was grasped with curved artery forceps and cut between the forceps and the eyeball. The nerve was then put on the stretch and cut behind the artery forceps. This portion of the nerve, with the eye, was sent to the pathologist for examination. The eye was noticeably enlarged, as it was difficult to get it thru the palpebral fissure after its separation. The wound in the conjunctiva healed without incident.

Pathologist's report. "The retina is completely detached in this specimen and almost completely involved. Only a very small portion can be recognized as retina. The optic disc is involved. While the sclera does not appear to be involved in this particular section, there

is extraocular extension of the growth between the loose tissue about the ball.

Diagnosis: Glioma exophytum.

Subsequent History. After receiving the pathologist's report to the effect that the growth was gliomatous, I advised the parents to have the orbit exenterated, but they refused, saying that they would rather lose the child than have this deformity, so at the end of two weeks an artificial eye was inserted, and as the parents lived twelve miles from town the child was seen only occasionally. Two months after enucleation the mother brought the child again to the office, stating that they had noticed that the artificial eye was being displaced inwards.

Examination revealed a tumor mass, soft in consistency, about the size of a small marble, under the conjunctiva, situated slightly to the temporal side. I explained to the parents that the growth had recurred and advised as a last resort the exenteration of the orbit and the use of radium, but they again refused, as I could not promise them a complete cure, but they had heard of cures in other cases of malignancy, so two weeks afterwards they decided to have the second operation done. On December 17th, the orbit was exenterated and the pathologist's report was to the effect that the growth was gliomatous.

On December 23rd, January 3rd, 7th, 14th, 21st, and February 12th, 20 milligrams of radium were placed between the lids and left there in each instance about five hours. But the growth again showed symptoms of recurrence and the use of radium was abandoned.

Fig. 1. Fig. 2. Fig. 3.

Showing appearance of recurrent tumors June 11, 1921. 1, from the right; 2, front view; 3, from left side.

The growth gradually increased in size. The child was seen from time to time and the growth kept gradually increasing. The child has slowly lost in weight, has lost her appetite and is irritable, sleeps badly, mostly under the influence of paregoric, but her mental condition has remained good. On June 11th photographs were taken as shown, and it will be noticed that there is a large tumor mass originating in the eye socket and protruding forward, looking very much like a truncated horn. The surfaces are fungating and bleed very readily and the whole mass emits a sickening, musty odor. The nose is forced to the left and is almost covered by the tumor mass. The right nares is

closed, so that the secretions find their way backwards into the naso-pharynx and thence into the throat.

The photograph also shows a large smooth tumor mass situated on the right lower jaw, at first bluish in color due to venous stasis. The surface is also smooth and glistening. This tumor extends to the right clavicle, below and well beyond the middle line in front. Behind, it extends beyond the middle line and as high as the occiput. Above, it extends almost to the top of the ear. The lower pendulous portion is soft and fluctuating, evidently containing pus. Superimposed upon this mass is another smaller fluctuating tumor about the size of a hen's egg, located at the site of the preauricular gland. There is another tumor mass about the size of a walnut at the postparietal area in the midline. On the left side, the submaxillary glands are enlarged and the whole chain of cervical glands are palpable as far down as the clavicle. No glandular enlargement below the clavicle on either side. In the sulcus between the fungating mass and the tumor mass of the jaw, pus is exuding posteriorly.

July 6th: The horn like mass above described has enlarged in size to such an extent that the child's nose is buried under the growth and extends beyond the middle line, obscuring the vision of the left eye. That portion of the supermaxilla on right side containing the teeth is forced to the left about a quarter to a half inch. The mouth is distorted so that the taking of medicine and nourishment is difficult. The large tumor mass of the right jaw has also enlarged in size, and has increased in venous stasis, and the growth projects beyond the clavicle. The child is now confined to its crib and refuses nourishment. Death will probably take place shortly no doubt from exhaustion.

FREQUENCY AND NATURE OF GLIOMA.

The subject of glioma retinae is interesting not only on account of the nature of the tumor, concerning which there is always some difference of opinion, but also on account of its comparative rarity. According to statistics the tumor is observed only once in 10,000 cases ordinarily presented in ophthalmologic practice, so that the average ophthalmologist may not have the opportunity of observing a tumor of this kind in his ordinary practice.

I am deeply indebted to Dr. Paul D. Berrisford of St. Paul, Minn., for his interest in this case and for valuable notes drawn from his article: "Statistical Notes on Glioma Retinae,"[1] in which he brings the cases of glioma in the Moorfields' Hospital, London, practically up to date, and he writes me recently that there has been practically nothing new on glioma since 1916. The cases in Moorfields' Hospital were written from 1871 to 1905 by Lawford and Collins,[2] Marshal,[3] and Owen,[4] and Dr. Berrisford has brought them up to date.

The first accurate and scientific description of the tumor was written by Wardrop[5] in 1809, based on the study of 17 cases. In 1853 Virchow[6] published the result of his exhaustive clinical and pathologic research.

Both Wardrop and Virchow observed the similarity between glioma and the white substance of the brain. The term glioma retinae, due to Virchow, does not seem to be strictly correct. O'Connor[7] remarks that a glance at the literature of gliomatous growths will show manifold variations in those cases in which the retina was entirely obliterated in the tumor mass, and others in which the layer of rods and cones was demonstrated to be clearly free from participation in the pathologic process. The point is fully discussed by Flexner[8].

Flexner and Wintersteiner[9] contend that the correct nomenclature is *neuroepithelioma*, as the tumors have their origin in the neuroepithelial layer of the retina, but the old term is retained on account of its general use, at the same time being more comprehensive. It is also called sarcoma of the retina and fungus hematodea oculi, a term used by the older authors. Beer [10] called it amaurotic cat's eye. The tumors are subdivided by Hirschberg [11], [12], according to their location and

direction of growth, into exophytum and endophytum. In glioma exophytum the growth proceeds towards the choroid after the retina has been detached. It finally reaches the choroid and spreads out superficially and may go as far as the anterior chamber, or vessels may grow out from the tumor into the choroid accompanied by tumor cells. In glioma endophytum the growth is attached but loosely to the retina and grows forward into the vitreous, and as a rule the growth completely fills the eye. This form of growth is the more rare.

All are agreed that this neoplasm originates in the granular layers of the retina, and most commonly in the inner granular layer. The tumor is composed of small cells in a very soft basement substance. The cells consist of a definite nucleus surrounded by scanty protoplasm, and in many cases possess processes. The cells follow the blood vessels, and on account of their rapid growth may take the appearance of tubular glands. Some are glia cells and others are ganglion cells. Degeneration in the intercellular substance takes place early.

The cause of glioma is unknown. The disease is one of infancy and childhood, no true cases having been known after the age of sixteen, according to the Moorfields Hospital reports covering 135 cases from birth to seven years of age. The highest percentage was found to occur during the second year of life, gradually increasing from infancy to that age, then receding till there were only two cases in the 135 at the age of seven years. 56 cases, or 41 percent, were first noted before the thirteenth month; 26 cases during the second year—only two cases being reported in the seventh year.

Quoting again from Berrisford's report at Moorfields Hospital: Between the years 1871 and 1913, covering 42 years, the total number of out patients numbered 1,259,452. Out of this number there occurred 131 cases of glioma retinae, or roughly, 1 in 9600 cases, or .01%. Other authors have about the same percentages.

Males and females are affected about equally, with the balance slightly in favor of males. In 792 cases collected from many different sources, there were 398 males, 361 females, and 33 cases in which the sex was not stated.

In 25% of cases, both eyes were affected, the disease originating in the second eye independently of the first, and not passing by continuity thru the chiasma.

Wintersteiner in his work gives an interesting report as to the relative frequency with which the various parts of the body become involved in the metastatic process. I quote:

Brain and Membranes, 43 times,
Skull and Bones of the Face, 40 times,
Lymphatic Glands, 36 times,
Parotid Gland, 9 times,
Skeleton Bones, 9 times,
Liver, 7 times,
Spinal Cord and Membranes, 5 times,
Kidneys, 2,
Ovaries, 2,
Lungs, 1,
Spleen, 1.

It is interesting to note in the case reported that the bones of the face were affected, also lymphatics and parotid gland, but the brain was apparently not involved. The probable reason for this will be given later.

Professor Fuchs says that a congenital morbid disposition or, as he aptly puts it, "a congenital vice of development," very often lies at the bottom of glioma, and he says that often it is observed at such an early age that the beginning must be dated back to fetal life. This prenatal origin calls to mind a statement of Treacher Collins: "That a microscopic specimen of a fetal retina at three months with layers undifferentiated, is such that if shown to a pathologist it would be pronounced by him as glioma."

That the disease runs in families is beyond doubt. Many striking cases are on record. The following reported by Berrisford will suffice:

The Grover family is very interesting. Thomas Grover was operated on in 1859 when five months old, the left eye being removed for glioma. He survived and had a family of two chil-

dren. The son, Frank, had his eye removed at three years and died at the age of fifteen from paralysis. The daughter's, Beatrice Wallbank, first three children all died at four years with glioma, two of them having bilateral glioma. The next four children were all healthy, but the eighth—the last child, died at three years from double glioma. Professor Fuchs records a case in his text book in which a child of four years died of brain symptoms following removal of a gliomatous eye. Later on the brother, aged 2, was found to have the same trouble in an eye blind from birth, and died from double glioma. A third child was suspected of having glioma, but the trouble proved to be coloboma of iris and choroid. Newton reports a case where ten out of sixteen in the same family died with glioma.

Glioma in a Shrunken Eye. The presence of glioma in a shrunken eye is a rare condition; only about twenty cases are recorded in all literature. Dr. Denis O'Connor[7] of Worcester, Mass., records a very interesting case in an infant, in which the shrunken right eye was removed and was found to be gliomatous. The child died later on from glioma of the left eye without recurrence in the right. His conclusions are to the effect, that after destruction of the retina the necrosis progressed, the necrotic masses being replaced by connective tissue which in turn is invaded; and the cycle is repeated until finally the eye becomes quiescent, having undergone necrosis and calcification, thru as he thinks, insufficient blood supply. But he further states that some of these cases finally die of recurrences, and he records many of these cases as pseudogliomata or as an episode in the course of true glioma preparatory to further advance. This probably explains the cure by ophthalmologists of one hundred years ago, who resorted only at that time to antiphlogistic, alternative and derivative treatment.

Differential Diagnosis. In making differential diagnosis the history of the case, as well as the family history, is important. One must inquire for history of injuries to the eye, and ascertain if the child has had meningitis or other infectious diseases common to childhood, and the signs of iridocyclitis and keratitis punctata must be looked for. The rare diseases, such as:

Acute Suppurative Hyalitis,
Cysticercus in the Vitreous,
Retinitis Circinata,

Detachment of the Retina with dropsical degeneration of visual cells, reported by de Schweinitz, must be kept in mind as a possibility. Simple detachment of the retina and leucosarcoma are both rare conditions in childhood. A corneal cicatrization or staphyloma may obstruct the pupillary space, or in the glaucomatous stage of glioma a hyphema or cataract may obscure or prevent ophthalmoscopic examination; or hemorrhage into the vitreous may become organized and render the diagnosis difficult. Persistent vascularity of the lens casule or hyaloid artery with posterior polar cataract may also lead to a wrong diagnosis. Tubercles of the choroid and chronic inflammatory processes in the choroid and ciliary body are the two conditions that call for careful discrimination, and often a positive diagnosis cannot be made until after the eye is removed. A report from Moorfields Hospital from 1888 to 1893 indicated that seven of twenty-four eyes enucleated for glioma were pseudoglioma. In the case reported all the clinical symptoms were present with one exception—the tumor mass did not show vascularization, which is the rule.

Recurrences. The prognosis on the whole is very bad. It is only favorable when operation is done early and when the tumor does not extend beyond the retina. At least three years must elapse after enucleation before we can count on a permanent cure. In the meantime the other eye may become affected, or metastases may take place. We can count on a permanent cure only when the optic nerve is intact and the tumor is confined to the retina. The percentages of recovery given are small. Hirschberg figures on 6.5%; Wintersteiner 13.7%; Vossius 10%. In the Moorfields Hospital report, the percentage of cures is not given on ac-

count of the difficulty of tracing some of the cases, but Berrisford considered 9 out of the 41 cases enumerated by him as cured, more than three years having elapsed since enucleation.

Fuchs in his text book states that 3 cases of glioma have been reported as recovering spontaneously by shrivelling. De Kleijn[13] reported 18 cases of glioma retinae operated in Utrecht with eight recoveries. In 4 of these recoveries the optic nerve was free; in 2 the affection was peripheral; in 1 the optic nerve was completely involved as far as the section; in 1 the amount of involvement is not stated. In the case where the optic nerve was involved, the other eye became blind later and had to be removed.

Seventeen cases were reviewed by Hirschberg, of which 10 at the time of operation had not extended beyond the retina, and in none of these latter had a relapse occurred during a period of from 5 to 13 years subsequent to operation.

The radium treatment was carried out in the Department of Radiology and Electro-therapeutics of the Provincal Royal Jubilee Hospital, Victoria, B. C., under the direction of Dr. L. K. Poyntz. Dr. Poyntz thinks that while there are grounds for supporting the view that the more malignant a tumor is the more vulnerable it is to massive radiotherapy, yet it must be admitted that the rays may stimulate rather than destroy tumor masses. It is possible that radium had a stimulating effect in the present case.

Dr. Poyntz thinks that it is probable that a preparatory irradiation before enucleation, complete fulguration of the contents of the orbit at the time of operation, followed by intense radium treatment of those sites where recurrence is more common, might be a rational treatment of this type of case.

Verhoeff[15] quite recently reported that there were in literature only 2 cases in which an eye containing a glioma retinae was treated by radiation with apparent success. These cases were reported by Hilgartner and Schoenberg. Verhoeff himself reports a case in which, 6 months after enucleation of the right eye for glioma followed immediately by severe X-raying, a tumor developed in the left eye. This was immediately treated by X-rays. This tumor tho it had given rise to intraocular metastases had not invaded the optic nerve. Altho Verhoeff had not the opportunity to verify this tumor histologically, he thinks there can be little doubt but that it was a glioma. Altho it persists yet, the child's vision following the X-ray treatment appears to be perfect for the 3 1/2 years following treatment.

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GLAUCOMA A CILIARY NEURITIS.

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The essential pathology of this condition is held to be neuritic cyclitis from pressure on the ciliary body. Its severity depends on the extent of the inflammatory process. From the ciliary body the disease may extend backward and forward.

In this brief article I wish to present my conception of the actual causes and the essential pathology of glaucoma.

The idea, advanced here, is by no means a new one, but one hears so little of it, that I think it well worth while to be considered. I have made no reference to the different other theories, because they do not seem plausible to me, nor have I referred to other writers.

The actual causes I divide into three groups:

(1.) Lack of development, as we find in the congenital form in which the canal of Schlemm, and perhaps other parts that are concerned in the outflow of lymph, are either absent or incomplete.

(2.) Other ocular conditions, such as tumors, scleritis, iris bombé, etc., bringing on the socalled secondary type.

(3.) Trauma, either accidental, surgical or brought on by anatomic changes.

The latter form in which the trauma results from anatomic changes, is the most frequent; it is also the form that stimulates the keenest speculation.

The anatomic changes consist mainly in the enlargement and the hardening of the crystalline lens, and in a lesser degree in the hypertrophy of the ciliary body in hyperopic eyes.

Before such changes occur the distance from the lens to the ciliary processes is about 0.5 mm., so that the changes need not be great to bring the structures in contact; and gradually the ciliary body will be more and more pressed upon by the lens, the latter acting as a large foreign body. Hence I consider trauma the actual cause.

That after forty years of age most eyes, even the hyperopic, are free from glaucoma, is partly due to the fact that the anatomic changes are less marked, but principally to their coming on so slowly and so gradually that the structures are able to accommodate themselves to the new condition, while in glaucomatous eyes the changes have progressed much more rapidly.

THE ESSENTIAL PATHOLOGY.

The result of the constant pressure upon the ciliary body is a cyclitis, which is of a neuritic character; in other words, a ciliary neuritis ensues.

The severity of the case depends on the extent of the inflammatory process. From the ciliary plexus or plexuses, it may travel posteriorly along the ciliary nerves, and anteriorly along the branches which go to form the corneal plexuses.

In the milder cases, referred to as simple glaucoma, the ciliary body only is affected. In other cases that are usually also termed simple, the inflammation spreads posteriorly. The subjective symptoms may be rather mild in such cases, but whenever the process reaches the region around the optic nerve head, it will lead to more or less optic atrophy.

The ring that is formed around the optic nerve by the ciliary nerves and the posterior ciliary arteries, as they pass thru the sclera, is about 6 mm. in diameter, so that the ten to twelve nerve branches are only about 1.5 mm. apart; the inflammation then extends to the sclera and the vascular tissue. This leads to a degeneration and elimination of the delicate branches of the circle of Zinn, thus depriving the nerve head of nutrition.

The soft elastic tissue of the lamina cribrosa is the first to undergo atrophy, and other tissues follow. The process of degeneration approaching the nerve head from the periphery and affecting the tissues first that are in the plane of the lamina cribrosa, accounts for

the characteristic shelving and depth of the glaucomatous cup.

It goes without saying that increased tension must have influence in intensifying the atrophy and cupping, but I doubt very much that it is the etiologic factor; for if a bulging depended entirely on the tension, it would more likely be as we see it in high myopia, or following scleritis, not to forget the staphylomata that complicate glaucoma itself.

On the other hand it would be difficult to explain the atrophy and cupping occurring in simple glaucoma, in which the tension is only slightly increased, and in some cases not at all.

In the severe forms of glaucoma, called inflammatory and congestive, the process has traveled forward. About thirty-six nerve branches extend from the ciliary body thru the pectinate ligament into the cornea. These branches are at the limbus nearly 1 mm. apart, so that their swelling will readily obstruct the flow of lymph into the canal of Schlemm. The other lymph passages seem to be unable to compensate for this deficiency. I do not believe that any lymph escapes along the bundles of the optic nerve; otherwise we could hardly expect an increased tension preceding the atrophy; everything indicates that the drainage from all the chambers is by way of the canal of Schlemm and the crypts of the iris. I even think that the lymph from the perivascular spaces of the retina travels anteriorly after reaching the disc.

If we consider glaucoma a ciliary neuritis, then there must be an increased inflow from the beginning. We may, therefore, expect a plus tension, even if the outflow is as yet not interfered with.

Any increase in tension will tend to dilate the pupil and also tend to bring the ciliary body, the iris and the lens forward, thus aggravating the conditions by obstructing the filtration angle still more, and by eliminating the crypts of the iris.

To understand the forward displacement, we have to first consider the attachments of these structures; the most important one is by the pectinate ligament, which is firmly united with the sclera; it is situated anteriorly, extending 4 mm. from the limbus to where the suprachoroidal space begins. The other attachment is posteriorly into the choroid; it blends loosely into the latter and is very narrow radially.

The hydrostatic pressure within the three lymph spaces, aqueous, vitreous and suprachoroidal, tends to equalize and works upon the other structures until they attain the same pressure. By so doing the delicate structures of the ciliary body and the iris can only be compressed towards their firm attachment, the pectinate ligament, which is anterior, and also peripherally to the iris.

When the forward displacement does not occur, in spite of increased tension, I take it that the anterior portion of the suprachoroidal space is obliterated and that the annulus ciliaris adheres firmly to the sclera.

In conclusion I wish to say that I consider glaucoma:

1. A ciliary neuritis.

2. That it is inflammatory from the beginning.

3. That the inflow of fluids is increased from the beginning.

4. That with but few exceptions trauma, brought on by anatomic changes, is the actual cause.

5. That the optic nerve atrophy and the cupping are mainly the result of the inflammatory process and only to a lesser degree due to increased tension.

NOTES, CASES AND INSTRUMENTS

BILATERAL PERSISTENT PUPILLARY MEMBRANES.

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These two illustrations graphically depict the congenital condition known as persistent pupillary membranes.

They are vestiges of a membrane that normally disappears about the seventh month of fetal life. On closely examining the illustrations, we see that the membranes present one or more irregular openings in their centers, from which radiate narrow prolongations of the color of the irides. They are presumed to be remnants of blood vessels that have become covered by elastic connective tissue, in which pigment has been deposited. These projections are attached about the periphery of the pupils in the iris substance, and in no way interfere with their functioning. The irides, as the French would say, are bombés and the anterior chambers are consequently shallow. The trellis work of these membranes stands about one-half millimeter anterior to the irides, as tho it was supported by so many legs. Several fine fibers attach the posterior surfaces of the irides to the anterior capsule of the lenses. There is a central opacity of the right lens. Dilation of the pupils with atropin is normal. The vision in both eyes is 20/40. The inner half of each iris is grayish brown and the outer half is distinctly brown. Modern embryologic researches proved that these membranes are a part of the vascular sac of the lens alimented by the hyaloid artery. They are also supposed to be nourished thru their arcades from the irides, the posterior part of the lens receiving its nourishment from the artery of Cloquet. From these circumstances, these membranes may deviate from the supposed normal independently of the circulation in the lens or inversely. The irido-capsular adhesions are readily distinguishable from those due to inflammation by their elasticity, allowing free movement to the irides. These pupillary bridges are for the most part seen in only one eye; here both eyes are similarly affected.

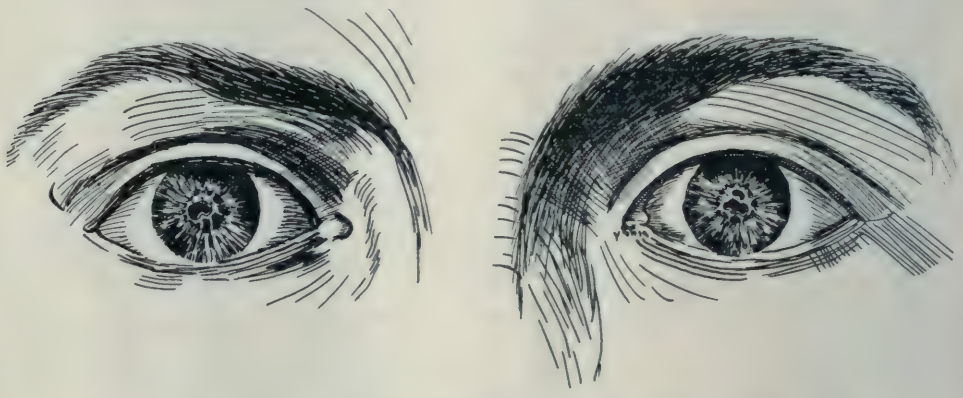

Fig. 1. Bilateral persistent pupillary membrane (Brazeau's case).

Their form, size, and consistency may vary, not only with the individual, but in each eye as shown in the illustrations.

These membranes do not cause any functional troubles. The pupil in the left eye resembles one in which an iridectomy was done, leaving the pupillary margin of the iris intact. There is no polyopia. The treatment consists in tearing an opening in the membrane whenever it completely occludes the pupillary opening. In this case it is advisable to let the condition alone. The patient was seen in consultation with Dr. Fowzer.

GONORRHEAL OPHTHALMIA IN A CHILD OF TWO YEARS.

JOHN A. MCCAW, M.D.,

DENVER, COLO.

A girl two years of age was admitted to the Denver City and County Hospital with an infection of both eyes. The eyelids were chemotic and closed. A thick creamy pus was being exuded from eyes. The clinical appearances were those of ophthalmia neonatorum. The laboratory report stated the infecting organism was a gram negative, intracellular diplococcus.

When the child was admitted, the chief resident interne ordered that the eyes be cleansed with warm boric solution every two hours, and constant application of cold compresses. A 25% solution of argyrol freshly prepared daily, was instilled in the eyes every two hours. Six days after the child was admitted, I saw the patient for the first time. The eyelids of both eyes were edematous and closed and there was a fairly profuse discharge from the eyes. I did not succeed in getting a view of the cornea.

In addition to the treatment that was being given we suggested that a 5% silver nitrat solution be applied once to the everted lids. After five days, there being no decided change in the condition, I stopped the argyrol and prescribed mercurochrom 1%, four times daily. Four days later the discharge was still profuse tho thinner and more watery. Smears taken at this time showed a gram negative intracellular diplococcus characteristic of gonococcus, but with less mucus in the smear.

The laboratory report notwithstanding, I felt that we must be dealing with a mixed infection; so I ordered the mercurochrom discontinued and prescribed zinc sulphat grs. 2, boric acid grs. 5, tr. of opium, dram 1, to aqua destillata fl. ounce 1. Two drops in each eye every two hours. The irrigation and cold compresses were continued.

In forty-eight hours the discharge was completely checked and the child had both eyes open and in another day the eyes appeared perfectly normal and the patient was discharged. The tr. of opium added to this prescription, has a mild astringent as well as anodyne effect, and increases the tolerance for the zinc sulphat in this strength.

CORNEAL ULCER FOLLOWING APPLICATION OF TONOMETER.

WALTER J. GILBERT, M.D.,

CALAIS, MAINE.

The June number of Ophthalmic Literature, quoting from Elliot's address before the British Society, states that great care should be exercised in using the tonometer, as complications may arise from traumatizing the corneal epithelium.

Within a short time the writer has had an experience demonstrating that the above advice is not wholly theoretic. Mr. J. H., age 76, a patient in Chipman Memorial Hospital, St. Stephen, N. B., while convalescing from a prostatectomy complained of failing vision extending over a period of one year. The attending surgeon, Dr. W. H. Bunker of Calais immediately referred the case. An ophthalmic examination revealed chronic noninflammatory glaucoma. In using the tonometer the following technic was carried out. Irrigations with warm saturated solution boric acid, 4% protargol and holocain for anesthesia. The piston of the foot plate was cleaned with alcohol, then sterile water and petrolatum. After readings, bichlorid ointment was instilled between the lids.

As the patient was a high strung, nervous man, a protective bandage was applied. Examination was made at eight A. M. The following day, the nurse had charted "patient complains of pain and discomfort in right eye." At nine A. M., or twenty-four hours after examination, the eye had well marked subjective symptoms of ulceration, and in forty-eight hours there was no question as to the condition we had to deal with. The treatment consisted in cauterizing the area, outlined by fluorescein solution, fomentations and frequent instillations of mercurochrome 1%. Both eyes were kept bandaged

during the intervals between treatments and the patient made a good recovery.

One of my colleagues suggested an impending ulceration before examination, but there were no symptoms to substantiate this. It would be well to state that the same morning two other patients had tonometric readings, but not the slightest complication arose from examination of these patients.

The object of reporting this case is to emphasize the importance of Elliot's suggestion: That is, keeping old people under observation for at least twenty-four hours after tonometry.

DETACHMENT OF THE RETINA FOLLOWING INTRACAPSULAR CATARACT EXTRACTION.

WALLACE RALSTON, M.D., F.A.C.S.,
and
E. L. GOAR, A.B., M.D.,
HOUSTON, TEXAS.

The following case is reported for the reason that, judging from the literature and from conversations with advocates of the Smith-Indian operation, it is a very unusual sequela. In a recent conversation with one of the leading American exponents of this method, we were informed that he had never seen this unfortunate complication.

J. F., age 71, retired merchant. Had lens extracted from right eye two years ago. With correction vision right eye 20/50, left eye light projection perfect. Has a slight secondary in right eye, in the left a mature cataract. Well nourished man. Has moderate degree of pyorrhea. Urinalysis was negative. Teeth and gums were put in good condition by dentist. May 18, 1921, cataract extraction was done on left eye by the Smith-Indian method. No undue pressure on cornea was necessary for expression. There was no loss of vitreous and operation was uneventful. Dressed first on 7th day. There was very little injection. The pillars of the coloboma were free. Anterior chamber had not formed and iris was in apposition to posterior surface of the cornea. On the 9th day there was still no anterior chamber. A grayish mass was noted forward on the temporal side, easily visible by oblique illumination and having the typical appearance of a retinal detachment. Three days later the same condition appeared on the nasal side. June 4th, sixteen days after operation, the gibbous protrusion appeared above and below, forming four distinct projections. The eye was still soft, very little injected and there was no anterior chamber. The first evidence of the reforming of the anterior chamber occurred June 11th, twenty-three days after operation. By June 20th the detachment had disappeared above and below and was less marked laterally and mesially. The anterior chamber remained shallow and the tension low until about July 5th, tho there was no evidence of detachment seen on June 25th. On July 11th there was a good anterior chamber, very little injection, and the tension was normal by palpation. Some small retinal hemorrhages were visible with the ophthalmoscope and the fact that one of these was in the macular region may explain why this patient's vision was never better than 20/100 with correction.

It is worthy of note that altho the prolonged absence of the anterior chamber pointed to a choroidal detachment, the protrusions had the typical form and color of detachment of the retina. Also that aside from a few vertical striae which rapidly disappeared, the cornea was apparently uninjured by its prolonged apposition to the iris.

AMULETS FOR THE CURE OF DISEASES OF THE EYES.

HARRY FRIEDENWALD, M.D.,
BALTIMORE, MD.

Amulets played a leading part in the treatment of disease, in ancient and in medieval times. "Over vast regions of the earth to-day, magic amulets, charms, incantations are the chief weapons of defense against a malignant Nature." (Osler.)

The eye has enjoyed special favor, and

as late as 1583, Bartisch in his work on diseases of the eye, *Augendienst*, devoted a chapter to the evil effects of witchcraft

Fig. 1. Arab amulet worn in front of an inflamed eye. Made up of old Turkish silver coin and polished piece of sardonyx, suspended on a red cord. Size of original.

on the eye and the benefit of amulets (Hirschberg, Graefe-Saemisch Handbuch, Vol. XIII, part I, u. 351).

In the Orient where ophthalmias are common, in spite of the common application of pigments for the eye, the use of special amulets for their relief is often met with (Medical Pickwick, March 1921). They are made of beads or precious stones, which together with an old silver coin, are attached by a red silk cord to some strands of hair, above the forehead or to the cap and thus hang down in front of the inflamed eye. In Palestine they are called *charazet el-bazle*. To be effective it is considered necessary that a piece of garlic be attached (Dr. Canaan's Aberglaube und Volksmedizin im Lande der Bibel, Hamburg 1914, p. 126). The writer obtained an amulet of this kind from an Arab boy, who came for treatment to an eye hospital in Jerusalem. It is pictured in the accompanying illustration.

Truth may be stranger than fiction, but for vitality and longevity, the latter often has the advantage. Those interested in the subject will find a comprehensive account in the two volumes by Dr. Seligmann, an oculist in Hamburg, entitled "Der boese Blick." 1910.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE, LONDON.

Section on Ophthalmology.

Friday, February 10th, 1922, the President of the Section, Dr. James Taylor, occupying the chair.

Symmetric Macular Disease.

Mr. Frank Juler showed a youth with symmetric disease of the maculae. The changes were quite superficial in the retina, not in the choroid. The youth was sent up by his employers in a rubber factory to find out whether anything could be done for him, and also to ascertain whether the condition had any connection with his occupation. He had been at the factory three years, his eye condition having appeared just before he started there. It was ascertained that the lad's work did not bring him into contact with the fumes given off in the manufacture; and Mr. Juler did not think there was any relationship of the condition to the employment. From the appearances it might possibly be a case of familial disease, such as Dr. Batten pointed out in association with cerebral degeneration; but this lad was quite bright and alert, and seemed to have done well at school.

An elder brother of the patient was affected somewhat similarly, and he had been seen by Mr. Burdon-Cooper, of Bath, in 1915, when he was 21 years of age. Vision was 3/60 in each eye, and there was central choroiditis. He was given some mercurial ointment for inunction, and he was seen again in 1919, when the vision was much worse, and the Wassermann reaction had been positive on two tests. Some members of other branches of the present pa-

tient's family seemed to be affected by a similar condition. Another possibility was that this condition was inflammatory. But the boy appeared to be healthy, his Wassermann was negative, and it had remained so even under a provocative dose of novarsenobillon. Von Pirquet was negative; the only feature out of the ordinary which was discernible was the presence of some septic crypts in the tonsils.

Plastic Operation for Lid Deformity.

Mr. Oliver showed a patient on whom a plastic series was being done, with the object of making a passable eyelid. The subject was a man who was wounded in 1916. When he came to the exhibitor two months ago he had had a number of operations. When he saw the man, the condition was that the whole of the skin of the upper lid was pulled up and was adherent to the upper orbital margin. The cornea was exposed, and there had been severe corneal ulceration, which had left a nebula. He first excised all the scar tissue, and he thought that in all plastic operations it was most important to replace tissue in its normal situation. The tissues of the lid which were left could then be replaced, with some of the lashes. That left a large bare surface to be covered up, and it was covered by a temporal flap, in which flap it was very important to include the superficial temporal artery. All that now remained was to remove the whole pedicle. The operation was Major Gillies', and he had found it a most useful one.

Cholesterin Crystals in the Cornea.

Mr. R. Affleck Greeves showed, as a curiosity, a patient with cholesterin crystals in the cornea; he had not seen or heard of such a case before. Cholesterin was common in other parts of the eye: in the retina and vitreous, and sometimes in the anterior chamber and lens. This patient had had extensive chronic ulceration of the cornea, with much photophobia and pain. There was found to be chronic disease of the antrum. After that had been treated, the ulceration cleared up a good deal and healed over. There were still attacks of pain and photophobia, but without ulceration. The patch of cholesterin had gradually increased in size for a year, and now there were also two smaller patches. The cholesterin probably resulted from the splitting up of the protein molecule, and, apparently, it could arise from the degeneration of blood, or from degeneration of tissues, tho the usual form of degeneration was hyalin, with calcareous deposits.

Discussion. Mr. M. S. Mayou referred to one case he had seen of cholesterin in the cornea, that had long-standing interstitial keratitis. There were a number of vessels going up towards the patch, and he thought there had been some hemorrhage from these vessels into the corneal substance, which had given rise to the cholesterin. These deposits were more frequently associated with hemorrhage than with any kind of degeneration.

The President thought there must be some associated cause not yet determined, otherwise it must occur much more frequently.

Mr. Greeves pointed out, in reply, that with the lessening of the blood vessels the cholesterin patch was getting bigger.

Structures Associated with the Choroidal Fissure.

Miss I. C. Mann read a paper, supplemented by models and an epidiascopic demonstration, on "The Morphology of Certain Developmental Structures Associated with the Upper End of the Choroidal Fissure." The particular structures she was concerned with were: (1) a small, cone shaped mass of cells in the center of the optic disc in the human embyro of the 10th week and later; (2) the mass of unpigmented cells found just below the optic stalk, on the outside of the eye, in a 6th week human embryo. She wanted to show these structures were produced by a more rapid growth of the inner layer of the optic cup than of the pigment layer.

She had arrived at the conclusion that, from this point of view, the eyes of vertebrates could be divided into those showing an overgrowth of the in-

ner layer, and those which did not show it. In a six weeks human embryo the pigment layer was thicker, and the inner layer was separated from it. She demonstrated a small mass of unpigmented cells which was continuous with the pigment layer, a point to which she attached importance. A section thru the eye of a two day chick showed a greater elaboration of structures connected with closure of the choroidal fissure. There was here a definite overgrowth of the inner layer, that layer being thrown up into folds, and in the region of the fissure the unpigmented inner layer was heaped up on the inner side, forming a ridge, and was everted in the lips of the fissure, where the inner layer became continuous with the pigment layer.

At this stage, in the bird's eye, the upper part of the eye, above the insertion of the stalk, was bigger than the lower part, and the bird's eye grew by extension of the lower part below the insertion of the optic stalk. It was stated that the bird had not a definite hyaloid artery, but in very early stages one could demonstrate a mesoderm containing blood corpuscles, this strand passing across the eye, similar to the hyaloid artery in mammals.

Miss Mann proceded to show a large number of excellently prepared specimens from different animals and from the human embryo. It had been found that the hyaloid artery got on it a bulbous enlargement as it was passing thru a mass of cells, and it was this budding out which vascularized the mass, and their insinuation among the nerve fiber layer formed definitive branches of the arteria centralis retinae. The small mass of unpigmented cells on the outside of the embryonic eye was the remains of the portion of the inner layer which occasionally became everted in the upper part of the cleft, before it closed. If the eversion took place only at the upper end of the cleft, and no nerve fibers grew into it, as in man, the little mass after a time disappeared.

Discussion. Dr. Leighton Davies spoke of a case he had in which all the retinal vessels appeared at the periphery of the disc, just as in the rabbit's eye.

The President expressed the congratulations of the Section to Miss Mann for her interesting demonstration, and the beauty of the models and specimens with which she was working.

Choroidal Sarcoma.

Dr. Henry J. May and Mr. F. A. Williamson-Noble contributed papers on this subject, Dr. May describing the clinical and operative details, and Mr. Williamson-Noble the pathologic findings. All the three cases were seen by Dr. May within 19 days.

The first patient, a robust man of 60 years of age, complained of failing vision for near work, and discomfort with his glasses during a year. His distant vision was perfect. There was no evidence of inflammation in either eye. The tension in the right eye was a little fuller than in the left; the right pupil was slightly larger than the left, and was sluggish to light; the media were clear. In the fundus, below the outer side of the optic disc, he found a kidney shaped swelling, measuring 1 1/2 discs one way, one disc the other; on its border were two small retinal hemorrhages. There was evidence of a pushing forward by a solid mass behind. The man had been getting thinner in the last 4 1/2 months. At that time, he would not consent to the enucleation operation which was urged. Seven months later he returned with an attack of acute glaucoma. The eye was then quite blind, and no view of the fundus could be obtained. Three days later the patient consented to enucleation. Dr. May found a typical mushroom shaped growth, with a broad base, and it occupied the whole macula; the retina was detached. There was no evidence of extension of growth. On section the growth did not seem to have involved the sclerotic coat, and section of the optic nerve showed no sign of growth.

The second was in a man aged 52, very healthy looking. He had a painful red eye, but no trace of iritis. The cornea was bright and clear, and the tension plus 2. The anterior chamber was apparently obliterated, and the iris seemed to be in contact with

Descemet's membrane. An opaque iridescent lens was tilted forward. On enucleating the eye he found a melanotic sarcoma the size of an average pea. As section of the optic nerve showed a suggestion of extension of growth to it, the orbit was exenterated. There were as yet no signs of recurrence.

The third patient was aged 67. He had been unable to see with the right eye for six months. In the right fundus, external to the disc, there seemed to be a large pigmented mass, with folds of retina lying over it or intermingled with it. The edge of the right optic disc was blurred and indistinct. Over four months later the man said his eye was totally blind; the pupil was dilated and inactive. In the fundus could be seen a large mass pushing the contents forward. Tho 5 feet 11 inches in height, this patient weighed only 85 pounds. The eye was enucleated. The growth was a melanotic sarcoma; the optic nerve showed no extension of the growth into it. The patient had since had pains in the chest and abdomen, so there was reason to fear visceral involvement and a downward course.

Dr. May discussed a number of general questions connected with this type of case, and Mr. Williamson-Noble followed with a demonstration of sections of the growth.

H. Dickinson.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

February 20, 1922.

Dr. Frank E. Brawley in the Chair.

Retinitis Pigmentosa?

Dr. Michael Goldenburg reported the case of Mrs. L. B., colored, age 38, who stated that she had no eye trouble in youth or at any time until October, 1917, when her left eye was struck by a piece of wood. This eye was enucleated in December, 1917. About three weeks after the accident to the left eye, she began to have severe frontal headaches, marked photophobia; various colors appearing before the right eye. At the time of the accident patient went unattended, but within five weeks after the accident she required some one to accompany her, not because she was unable to make her way along the streets, but because when she arrived at the doctor's office she had to enter thru a small dark hallway. She was unable to make her way thru this hall, and when she entered the office she was unable to find a chair. Patient cannot give any information as to consanguineous marriages. At the time of enucleation of the left eye, the vision of the right eye was very poor, everything appearing blurred even in the presence of good illumination. About three months after the enucleation, vision in the right eye started to improve and soon she was able to distinguish objects, and to thread a needle under good illumination. There was not much change in vision from this time up to the time of entrance into the hospital.

In the hospital it was found that she had a four plus Wassermann.

On admission she had tubular vision, 20/20. Ophthalmoscopic findings: Disc fairly well defined, small crescent of pigment on temporal side of disc, disc appeared pinkish, lamina cribrosa not visible, shallow physiologic cup. Arteries markedly contracted and straight. Typical bone corpuscle pigment in periphery, anterior to vessels. In several places the pigment follows the vessels in a straight line and anterior to them. Fundus tessellated; no atrophy or arteriosclerosis of choroidal vessels apparent. Perimetry disclosed a contraction to 10 degrees. Refraction: small error, not improved by glasses.

His only object in presenting this case was that he had never seen a case of retinitis pigmentosa in a colored person before and thought it worth while reporting.

Discussion. Dr. Harry S. Gradle asked whether the case might not be one of luetic retino-choroiditis instead of retinitis pigmentosa.

Dr. Goldenburg replied that the patient was getting a regular course of antisyphilitic treatment. He had seen two cases in which there was some question as to whether it was retinitis

pigmentosa or syphilis. In these cases he found some parts of the field with pigment of a darker character. It did not assume the feathery arrangement seen in retinitis pigmentosa as in this particular case.

Dr. George F. Suker did not believe there was a case of retinitis pigmentosa reported in the literature where the disease started at the age of this individual. Retinitis pigmentosa began early in life; it might go on for years without manifesting any symptoms to speak of, but eventually there would be symptomatology of one form or another. Vision might remain absolutely normal for years, but sooner or later there would be a dimming and marked contraction of the field of vision. It was not necessary in retinitis pigmentosa to have the pigment symmetrically distributed thruout the periphery of the retina. It may even at first be limited to the nasal or temporal half of the retina for many years, but eventually it will involve the other half also.

In this particular case he thought the element of syphilis was a strong possible feature, and then the case would not be one of true retinitis pigmentosa, but a retinitis syphilitica pigmentosa, pure and simple, giving the same characteristics of poor night vision as in a true retinitis pigmentosa. Furthermore, the pigment spots would later on, or even now, assume the bone corpuscle outlines, the same characteristics as one saw in retinitis pigmentosa. Another difference between this case and retinitis pigmentosa was that this nerve head was not a waxy yellow with an evident neuritis but presented a clear cut optic atrophy picture, as seen secondary to lues. Retinitis pigmentosa was a retinal lesion, pure and simple, while in this case there was already considerable choroidal involvement, much more so than obtained in a classic retinitis pigmentosa. So far as the symptomatology and the visual fields were concerned, they were practically the same in the two diseases, but the pathology was quite different.

Dr. Robert von der Heydt stated that he had had an opportunity to study this case with the large Gullstrand binocular ophthalmoscope. The lesions he saw were absolutely confined to the retina and their depth was beautifully shown stereoscopically.

Dr. Thomas Faith suggested the patient might have had monocular vision before one eye was lost.

Dr. Goldenburg said the patient did not know her vision was bad until this eye was destroyed. She gave a history of having poor vision in the eye for some time past. He thought there was no question about the case being one of retinitis pigmentosa. In colored people the nerve head could not show up as typically as in a Caucasian. This was due to contrast. The proliferation of the pigmented epithelium in retinitis pigmentosa was secondary to atrophy of the choriocapillaris and destruction of the tissues anterior to this layer. The proliferation took place around the equator and as the condition progressed, it extended on toward the nerve head. In a syphilitic case one did not get the tubular vision as in this case, and did not get the marked straightening out of the vessels. His own interest in this case was that it occurred in a colored individual, and he had never seen it before. If the case were luetic, he presumed active antiluetic treatment would be of material benefit.

Dr. Harry S. Gradle thought it would be well to hold the diagnosis of retinitis pigmentosa is abeyance until it was seen how the patient progressed under antiluetic treatment.

Neosalvarsan for Toxic Amblyopia.

Dr. Cottle reported the following cases for Dr. G. F. Suker: A. S., gave a history of a "moonshine" debauch following which he became blind, and remained the same for two months when he entered the hospital.

At this time his vision was 3/200, discs definitely pale, and form fields constricted. There was also a well marked central scotoma for red. Patient had a chancre twelve years previously, but no other specific history, nor one of antispecific treatment. Wassermann tests on blood and spinal fluids were negative. The patient was put on K. I.

and daily sweats. For over seven weeks this was done, at which time the vision was still the same.

On January 27, 1922, the patient was given 0.3 grams of neosalvarsan intravenously. Two days later the vision

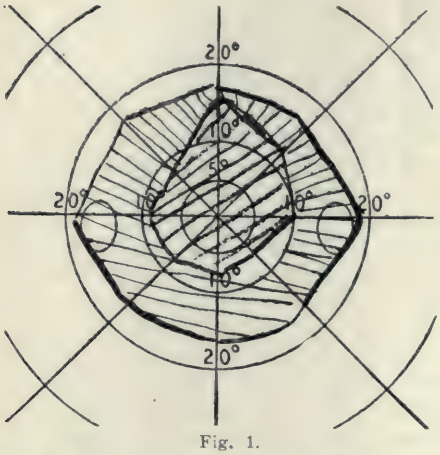

Fig. 1.

Fig. 1. Right eye, A. S., Dec. 8, 1921, central scotoma for red.

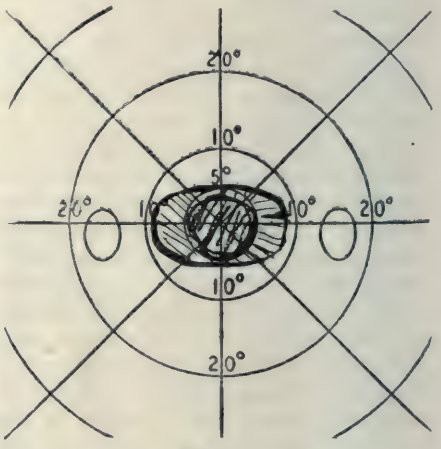

Fig. 2.

Fig. 2. Right eye, A. S., Feb. 20, 1922, scotoma much smaller.

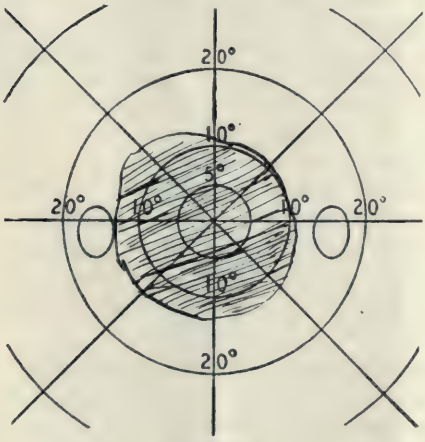

Fig. 3.

Fig. 3. Left eye, M. Z., Jan. 6, 1922, central scotoma.

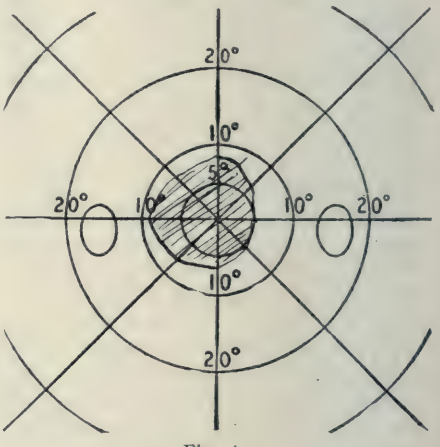

Fig. 4.

Fig. 4. Left eye, M. Z., Feb. 20, 1922, scotoma smaller.

was 15/200 and 10/100. The patient also noted that he could see finer print. One week later another injection was given. Four days later the vision was 19/200, and two days after this 20/200. On February 14 an injection of 0.6 was given, and two days later the vision was 20/200 (10/70, 7/50). This is the condition at the time of writing.

M. Z., gave a history of excessive indulgence in alcohol and tobacco, and one night he went on a spree and within thirty-six hours was unable to see any more than large objects a few feet in front of him. For eight months this condition prevailed, with but very slight improvement. He then entered the hospital.

His vision on entrance was R. E. 15/200; L. E. 20/200. The temporal sides of the discs were definitely pale. There was a central scotoma for red without much constriction of the form fields. Serologically the patient was repeatedly negative, and for ten days under close observation in the hospital

no change in vision was observed. Neosalvarsan, 0.3 grams, was injected intravenously. At this time there was started a daily injection of strychnin, which was the only other medication given. One week after the first, another injection was given, which was followed in five days by an improvement in vision in the left eye to 20/30. After another injection, one week later, the vision in the right eye was improved to 20/100.

Discussion. Dr. Suker stated: The question was why, in three cases—and a fourth one under observation—neosalvarsan or arsenical preparations accomplished so much good. Of the three cases, the third one was a soldier in whose case repeated spinal punctures were made. Methyl alcohol poisoning caused a ventricular and spinal hydredema; and, in the first few hours of a retrobulbar neuritis, there was not manifested any particular change in the disc, except a slight elevation of the disc edge, particularly on the nasal side. This ventricular and spinal canal hydredema disappeared usually within forty-eight to seventy-two hours, and then the optic disc picture ensued. There was really a moderate evanescent pressure edema of the nerve, which was followed by the retrobulbar neuritis.

The beneficial results obtained in these cases depend on two factors. First, the relief of pressure by repeated spinal punctures; second, the seemingly chemical antidote of the arsenic and as a nerve stimulant. Whether it was an antireacting agent was a difficult matter to determine; nevertheless, the fact was that neosalvarsan and other arsenics did considerable good. These patients were in the hospital for several weeks before anything was done for them other than spinal drainage as reported. Many serologic examinations were made, all proving negative. These patients did not receive ordinary pilocarpin sweatings and usual treatment, but the spinal canal was drained almost dry on several occasions and the arsenicals used. He suggested a trial of these preparations and drainage of the spinal canal in similar cases. The vision of these patients was now apparently stationary and the discs did not show any further atrophy as shown by maintaining a constant visual field.

Tumor of Conjunctiva and Subjacent Tissue.

Dr. Robert Blue presented the case of a young man in the early twenties, with a tumor of the right bulb of an unusual type. This tumor was situated beneath the bulbar conjunctiva, slightly elevated, sharply defined, and highly vascular. It did not extend into the cornea, but was confined strictly to the conjunctiva and subjacent tissue.

The history was that some twenty months before the patient discovered a growth in the eye without any irritation whatever. He had observed the case for eight months. During that time the tumor had not increased in size. The diagnosis was a benign neoplasm of unknown nature.

Left Homonymous Hemianopsia.

Dr. Edward F. Garraghan presented the case of a man, single, sailor by occupation, who had been a rather heavy drinker. He first saw him about the 15th of November, 1921, during an attack of pneumonia. At that time the vision was blurred, but this condition gradually cleared up entirely. Two months later the patient noticed that objects on his left side were lost to view, and he found difficulty in walking because he could not see to his left. On examination his vision was 20/20 in each eye. There was no paralysis of any of the external ocular muscles. The fundi of both eyes were negative. The field showed complete blindness of the temporal half of the right eye and the nasal half of the left eye. It was a typical case of left homonymous hemianopsia. Patient gave a history of a luetic lesion about twenty years ago. He gave a four plus Wassermann reaction, the Wernicke sign was present, and the lesion was, therefore, most likely confined to the optic tract.

Increased Intraocular Tension.

Dr. Thomas Faith read the paper

reporting clinical observations on this subject which is printed in full, p. 352.

Discussion. Dr. William A. Fisher stated that the essayist had cited cases where miotics had been given by ophthalmologists of good repute, where he would have given mydriatics. Plus tension, without any eye pathology that could be seen, required miotics and a search for the cause. Plus tension with a cause that could be seen required a mydriatic and the removal of the cause.

All of Dr. Faith's reported cases would have been given the same treatment he gave them, if he had followed this procedure. His first case, plus tension, traumatic cataract, required atropin, but it might have been quite as well had he also removed the lens which was causing the plus tension.

Within the year, he had had a case of tension in each eye of 54 with 20/25 vision, where eye pathology could not be found; pilocarpin was instilled, enemas given and six teeth extracted, two at a time, ten days apart. When the gums had healed, enemas and pilocarpin were discontinued. Tension remained normal and vision improved to 20/15 plus.

Another case of tension 60, vision in each eye 20/200. Eye pathology could not be found. The teeth, tonsils and sinuses were normal. Miotics and enemas were given and tension returned to normal, and vision 20/25 in the left eye but 20/200 in the right which had an old scar. This case was seen by one of the members of the Society who advised an immediate operation.

Dr. Fisher believed that many cases of plus tension would escape an operation if the teeth, tonsils, sinuses, alimentary canal and blood were treated when necessary, and miotics or mydriatics used as indicated.

Dr. Harry S. Gradle said Dr. Faith's paper was timely, because many cases of plus tension due to mechanical causes were overlooked, in the eagerness of a search for glaucoma. In these cases there was more or less mechanical obstruction of the canal of Schlemm. One might not be able to see it in the early stages, but sooner or later it would appear. These cases were particularly apt to be found in younger people. He recalled to mind two young women, 20 and 22 years old respectively, in whom plus tension developed as a sequence of cyclitis, proved to be of tubercular origin. In some of these cases it was impossible to reduce the tension, and operation became necessary to establish a free outlet to the anterior chamber. One could make a diagnosis practically in all cases by a careful examination of the anterior aspect of the eye for evidences of exudation manifesting themselves on the posterior surface of the cornea.

In many of these cases one could bring the tension down to normal by the injection of 1/1000 adrenalin underneath the conjunctiva.

Dr. Frank E. Brawley mentioned a case of simple chronic glaucoma, seen in consultation, with a small synechia. There was no way of telling when this occurred. The glaucoma had lasted for several weeks at the time he saw the case. Dilatation was effected under cocain, but after twenty-four hours miotics had to be resumed. The case went on to enlargement of the fields and quiescence under the miotics.

Dr. Faith agreed with Dr. Gradle that many of these cases were instances of mechanical obstruction. He reported a case he had watched carefully for weeks, but did not mention it in his paper, in which iridectomy was done with the idea that he had a primary glaucoma to deal with. Tension was reduced temporarily but came up again. He searched for foci of infection and removed them as well as he could. There was no exudation until several weeks after the tension had come down to normal. What brought the tension down he believed, was the improvement in general health and giving the patient a mixed stock vaccine. Then he saw shreds of exudate posterior to the ciliary body, but up to that time he could not see anything that looked like it. Where one would miss the exudates with the ordinary loupe and ophthalmoscope, he might be able to see them readily with

improved methods of examination, as with the slit lamp.

Comparative Anatomy of the Eye.

Dr. George E. Keiper of Lafayette, Indiana (by invitation) read a paper on this subject, illustrated by stereopticon slides showing various types of eye from the simple eye spot to the eye of man and especially of the bird, as the most perfect organ.

Dr. Robert Von Der Heydt,
Corresponding Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Section on Ophthalmology.

Thursday, December 15, 1921.

G. Oram Ring, M.D., Chairman.

Complete V-Shaped Discission for Zonular and Pyramidal Cataract

Dr. S. Lewis Ziegler exhibited two eyes operated on by complete V-shaped discission which were typical examples of slowly absorbing cortex due to calcareous deposits, and revealed the possibility of reclosure of the capsular sac from this cause, interfering with rapid solution of the lens substance, and in one instance requiring a secondary capsulotomy.

The patient, a female, aged 5 years, had always twisted her head in order to see with the left eye. The right eye showed typical zonular cataract, with sharply defined central pyramid of chalky whiteness. Apex, elevated and calcareous; surrounding cortex opaque, but periphery clear. Vision, 1/200, doubtful. Complete V-shaped discission was performed, but the cortex dissolved slowly, owing to its calcareous nature, and the capsule could not retract as freely as usual. Five months later, secondary capsular cataract, with calcareous pyramid persisting. V-shaped capsulotomy was performed, allowing calcareous nodule to drop down and back and leaving pupillary area perfectly free. Vision, with sph. + 8. D = 15/200.

In the left eye, there was a pyramidal catract, with a small white nodule in center of anterior capsule and faint haze in surrounding cortex. Vision = 10/200. Complete V-shaped discission was performed, and on the third day the lens was fully opaque, pushing forward against iris and causing it to bulge. Eye free from reaction or other evidence of ciliary pressure. Seven weeks later, absorption was found to be more rapid than in right eye, but slower than in the average case.

Plastic Operation for Cicatricial Ectropion.

Dr. T. B. Holloway exhibited a patient who had been injured by a wire rope containing a number of broken strands which had broken the nasal bones and lacerated the skin and the upper and lower lids of the right eye. At the time of coming under observation in November, 1920, there was a scar at the inner portion of the left upper lid, slight notching at its center, with a long scar that extended up and out across the tarsus and conjunctiva. The lower lid at its center showed a V-shaped defect completely thru the tarsus, and attached to the notch of the V was the apex of a symblepharon which extended from the fornix and bulbar conjunctiva. There was an entropion of a portion of the lower lid, adjacent to the outer limb of the V. The inner portion of the lid was everted, with marked curling outwards of the ends. There was also a defect at the lower portion of the internal canthus.

The first operation was performed in March, 1921, when the method suggested by Duverger was utilized with a most satisfactory result. A similar "halfing" procedure was described by Wheeler in 1919. In July a somewhat analogous V-shaped operation was done at the internal canthus, associated with a sliding flap taken from the side of the nose. This was done to give additional tissue in case of cutting out of certain sutures. On November 8th, a very slight defect remaining at the internal canthus was corrected with a final result that might be regarded as perfect, with complete restoration of the lower lid and conjunctival cul de sac.

Amaurotic Family Idiocy.

Dr. T. B. Holloway exhibited a Jewish female infant, aged fourteen months, the third child of healthy parents, without a history of consanguinity. The other children were perfectly healthy. The infant was born after normal labor, and continued to do well until the age of six months, when she developed whooping cough, and since that time has never regained her strength.

The child does not hold her head erect, and has not made any attempts to sit or stand alone. The head can be held up, but after a few minutes has a tendency to fall forward. The arms are usually kept extended and the fingers flexed. The grip of the hands is fair; when the arms are elevated and then released, they fall listlessly. At times one can note a slight athetoid movement in the forearms and hands.

An amaurotic stare is quite evident. No defects can be determined in the ocular rotations. The pupils are semidilated and do not react to light. In each eye there is a well defined optic atrophy associated with characteristic macular changes, the diameter of the gray white zone being about one and a half times that of the disc.

Dr. Holloway referred to the early reports before the Section made by Drs. Shumway and Buchanan, as well as later reports by the latter and Dr. Appleman. He referred to the pathologic changes observed by Holden, Shumway and Verhoeff, as well as exceptions taken by Coats after the statement made by Batten and Mayou concerning the analogy between these cases and family cerebral degeneration with macular changes, particularly as this relates to the existence of edema.

Discussion.—Dr. Wm. Zentmayer thought, from a case observed with Dr. Weisenburg, that when the child lives beyond the usual limit of two two years, the macular changes may disappear leaving only optic atrophy. Under these circumstances it makes it difficult to reach a neurologic diagnosis, as it is well known that in certain cases a differential diagnosis of this disease is dependent on the typical ocular findings.

Keratitis Profunda.

Dr. H. Maxwell Langdon gave the history of a girl, aged 25 years, with irregular haze of the center of the cornea, about 5mm. in diameter, not staining with fluorescein, and with ciliary injection, but not much pain. All physical tests were negative. The blood examination indicated a moderate anemia (Hemoglobin 70%, R.B.C. 2,992,000, W.B.C. 3,000). There was an advanced atrophic rhinitis.

At the end of two weeks the infiltration became more dense. One month after the first examination, the eye was exposed to three one minute applications of radiant heat from Shahan's thermophore, the thermometer recording 160°. In seventy-two hours the temporal portion was thinning, and in one week the outer half had absorbed, leaving a thin superficial haze. Ten days later a second application of radiant heat, at 180°, was given, and in seventy-two hours there was absorption of the remaining portion of the dense haze, in ten days only a small spot less than 1mm. in size directly before the pupil remained. After a third treatment the haze entirely disappeared, leaving a thin film apparently just below Bowman's membrane. Nasal treatment, was continuous, and under tonics the blood condition improved. Dr. Zentmayer saw the patient, and considered the condition as typical of keratitis profunda.

It seemed probable that the anemia was secondary to the rhinitis, and that absorption from the nasal condition was the cause of the keratitis. The prompt resolution of the exudate in the cornea following each "heating" seemed to have been a direct result of the treatment, possibly by producing the death of bacteria, if there was an actual invasion of the cornea by them, or an absorption of inflammatory exudate by increased circulation. The thermophore was held just close enough to the cornea to avoid contact.

Compulsory Application of Silver Nitrat to Eyes of New Born.

Dr. Edward Martin, Commissioner of Health of Pennsylvania, said that the Department of Health desired to bring to the Section for answer a simple question: "Shall or shall not legislation be passed which requires the silvering of every newly born baby?" It is generally, tho not universally, accepted that this silvering properly applied will prevent the development of an infection acquired during birth. It is further generally accepted, that if the infection be gonoccocal in nature and virulent in its course blindness may result, and does in sufficient number to contribute about 10 per cent. to our blinded population. Would this 10 per cent. be reduced to the vanishing point if the eyes of every child were silvered immediately after being born? Would it be reduced at all? Does the application of silver salts induce an inflammation which, supplemented by infection, may endanger the sight? These are subdivisions of the major questions. The enactments and rules bearing on this topic are as follows:

By the Act of June 5, 1913, every physician practicing in any portion of the Commonwealth, who shall treat or examine any infant suffering with ophthalmia neonatorum (inflammation of the eyes of infants) shall make promptly a report to the health authorities upon blanks supplied for that purpose, giving such information relating to the case as the health authorities may require. That midwifes or nurses or other persons having the care of infants whose eyes have become inflamed or swollen within two weeks after birth, shall report the same in writing within six hours of the discovery thereof, and shall make a similar report in writing to some regularly qualified practicing physician of the district. It shall be the duty of the health department, immediately upon the receipt of such report from other than a practicing physician, to notify the parent or guardian or other person having charge of the infant, of the danger to the eyes of said infant by reason of neglect of proper treatment of the same.

Every physician who shall treat any infant's eyes for ophthalmia neonatorum, shall within 48 hours after he ceases treatment, report to the Commissioner of Health stating he has ceased treatment and noting the condition of the infant's eyes at termination of treatment.

By the Act approved June 5, 1913, the Bureau of Medical Education and Licensure is authorized to formulate and issue such rules and regulations as may be needful for the proper conduct of the practice of midwifery by midwives.

In accordance with this authority, the rule has been promulgated that promptly after the birth of a child, the midwife must cleanse its eyes with water which has been previously boiled, and then drop from a dropper into each eye one drop of an one per cent solution of nitrat of silver. The eyes are to be washed immediately thereafter with boiled sterile water.

It will be noted that ophthalmia neonatorum is defined in the act as inflammation of the eyes of infants. The popular concept of an infant is that of a child less than two years of age; the legal concept carries the child to 21 years. Inflammation is a vague term and may be slight or severe, incident to a great variety of causes. It is obvious that, if this act were rigorously obeyed reports, and quite useless ones, would be rendered by the tens of thousands. The term ophthalmia neonatorum is generally construed by the profession to mean a severe inflammation of the eyes, usually gonoccocal in nature. It is upon this basis that reports have been rendered.

Dr. Wilmer Batt, the state statistician, notes that in 1920 there were 97 cases of ophthalmia neonatorum reported; of these, but 27 developed in the first week of life, the others thereafter. Infections after the seventh day were obviously secondary and not acquired during birth. Of the cases which were, or possibly were, infected during birth, there would be 3 in which laboratory examination confirmed the presence of the gonococcus. In none of these cases was there any permanent injury to the eyes. These

are the state records—inadequate, nonconclusive, but suggesting that crippling gonococcal inflammation of the eyes is less common than in former years. This in consonance with practically all infections.

Dr. Martin, with the data as presented, thought that the Section could give an answer to the question, upon which could be based suggested future legislation, in case it was believed to be needful.

Discussion.—Dr. G. E. De Schweinitz reviewed the ways for preventing ophthalmia neonatorum, namely, education, compulsory notification, the punishment by law of offenders against properly constructed legal regulations, and compulsory prophylaxis. He detailed some investigations, which the Commissioner of Health and he had made as to changes which might with advantage be incorporated in the present Pennsylvania law, and explained why they had concluded at that time, that except for making some of its provisions (early reporting, etc.) more stringent, they would advance no other suggestions. They had both decided that the subject, of great importance, should be subjected to further exact study, and therefore the Commissioner had come before the Ophthalmic Section in the hope he could obtain from its members expressions of belief which would be valuable in shaping additional legislation.

Expressing a personal opinion, Dr. de Schweinitz said the Crédé method (a 1 per cent. solution of nitrat of silver preferred) continued to hold its place as a prophylactic; thus far it did not seem that a more effective substitute had been devised. It was necessary in institution work and in the eyes of those children who pass thru a birth canal known to be infected, or from which the suspicion of infection cannot be eliminated prior to birth.

But the practice of the method should be in the hands of those who are competent to use it, and he doubted the advisability of an unrestricted distribution of the silver prophylactic; he had seen too many severe reactions because of the ignorance of those who employed it to think otherwise, and therefore felt that compulsory Crédé phophylaxis and the free distribution of the silver prophylactic were subjects which required additional study before a final decision should be reached, and tried to show how practically impossible it was to carry into effective operation a law of this kind. He detailed the advantages of compulsory notification, and quoted results in various States in support of this technic. He advocated the formation of a committee of oculists an obstetricians, whose duty should be, in consultation with the Commissioner of Health, to study the whole problem anew, and to make recommendations with respect to legislation in this regard.

Dr. Wm. R. Nicholson said there was no question as to the value of silver in the eyes of the new born as a preventative of gonorrheal infection, if its use is expertly carried out. He was not convinced, however, that it was in any sense a preventive in every case, and unless used expertly it has little if any value, while it may have distinct possibilities for evil. During the first three years in which the midwives were under the control of the Bureau of Medical Education and Licensure of this State, the use of silver was not insisted upon and it was practically not used. Since 1917, however, its use has been insisted upon, and it has been used in all cases routinely.

Since 1917, there have been delivered by the midwives of Philadelphia county, 33,726 babies, and the statistics which follow, are based upon this number of cases, all of which have been inspected by the graduate physicians employed by the Bureau for this purpose. There had been reported 85 cases of ophthalmia neonatorum, showing a smear which was positive for the gonococcus, in which silver has been used in each case; also fourteen cases of gonorrheal ophthalmia with positive smear, in which no silver had been used. With three exceptions, all the cases recovered without injury to the eyes. In the three above mentioned cases, the reason for the failure was

parental interference in two; while in the third, in which both eyes were lost, it was due to ignorance of the parents and neglect in reporting upon the part of the midwife. This midwife lost her license as a result of this negligence.

A decided increase in the number of sore eyes of a nonspecific nature has been found since the use of silver was insisted upon. Up to this time, however, there has been no report of ill results from ophthalmia due to chemical irritation. Finally, there has been no decrease, but if anything a slight increase in the number of cases of gonorrheal ophthalmia reported since the use of silver was insisted upon. All cases having sore eyes must be reported promptly by the midwife to the inspector who has her in charge, and every case is carefully followed until its cure has been attained.

Dr. Nicholson believed that the report of all cases of ophthalmia neonatorum should be made promptly to the proper authority, with the idea of insuring proper treatment to the new born infant, and that there should be some definite punishment inflicted if such report is not made. If the use of silver is alone insisted upon; that is, without the inclusion of the reporting clause, little will be gained, because of the ignorance among the midwives. He favored the use of silver in well organized hospital services, and used it as a routine in his services at the Presbyterian, and the Methodist hospitals, and the Graduate School of Medicine of the University of Pennsylvania.

Dr. Barton Cooke Hirst believed that midwives, hospitals and dispensaries should be required to use the Crédé method, but that physicians in general should use their judgment in the individual case.

Dr. Louis Lehrfeld (by invitation) said that an analysis of cases reported to the Bureau of Health of Philadelphia shows that, while a large proportion of cases occur during the first three days after birth, a fair number occur during the first two weeks and rarely as long as one month. In 1919, there were reported 60 cases, 27 of which were positive for gonococcus, having an incubation period from one to thirteen days; in 1920, 82 cases, 35 with an incubation period from one to eleven days. These data were obtained by medical inspectors of the Health Department. Similar data obtained of cases in 1917 by a trained public health nurse showed an "incubation period" common during the first two weeks and in one instance, as long as one month. The large number of cases occurring after the third day has a direct bearing on the use of a prophylactic, indicating either that the medication used inhibited the growth of the gonococcus, or that the organisms were of low virulence, or that the prophylactic used was ineffective or insufficient.

Dr. Lehrfeld believed that silver, as commonly used, is not a positive prophylactic for ophthalmia neonatorum He felt that one instillation of one drop of any solution, silver or other, gives a false sense of security and safety, and suggested that a bland antiseptic solution other than silver be used, and, instead of one drop, several drops should be instilled on three successive days.

Summarizing the records of blindness thruout the country, there were in 47 schools for the blind in 1920, 4144 pupils, of whom 997, or 24.1 per cent., were blind from ophthalmia neonatorum. The admission rate from this disease was 26.6 per cent. in 1907-08 in the schools, which rate decreased until 1917-18, when the rate was 14. 7 per cent. This ratio increased in 1918-19, and in 1919-1920 the admission rate was 23.2 per cent. These figures correspond with those from the Pennsylvania Institution for the Instruction of the Blind, where the percentage varied in different years from eight to fifty, and during the last 30 years averaged 26. He concluded that the blindness from ophthalmia neonatorum has not decreased in the proportions ordinarily supposed.

Dr. J. Hiland Dewey said he desired to direct attention to the subject from a rather different angle. Practicing in New Jersey where this law is in effect, he was frequently embarrassed by threats of law suits against doctors

who have not used the drops at the time of birth. The public is soon educated to the fact that the drops are required by law. The infants are brought to you, and no matter what the cause of the sore eyes may be, it is ascribed by the parent to the omission of the drops. Recently he saw a child, three weeks old, with congenital dacryocystitis, and the mother threatened a lawsuit against the physician who attended her for neglecting to use the drops.

Dr. T. B. Holloway referred to the number of cases that had been officially reported to the State Health Department, and felt that these were considerably less than the number of cases that had probably developed in the State. He alluded to the estimate he had made some years ago in the study of this subject. He stated that in the two schools for the blind in this State one hundred and twenty-two of the cases were the result of ophthalmia. The importance of the subject could be appreciated when it was realized that at the present time it costs over $600.00 a year to educate a blind child.

Concerning some of the figures submitted in regard to the percentages in schools for the blind, he thought it ought to be stated that Dr. Lehrfeld had included statistics from the institutions operated in connection with the public school system in some cities.

He was opposed to a compulsory law for the use of nitrat of silver for physicians and midwives, altho he appreciated the importance of its use by proper hands, in proper institutions, and in proper cases. What he objected to was the compulsory routine general use of the drug.

Dr. James Thorington said he was sorry that there had been any statement made which would reflect discredit upon the use of a one per cent. solution of nitrat of silver in the sore eyes of new born babies. He did not feel that this silver solution, when properly employed, would produce an inflammation of the eyes resembling ophthalmia neonatorum.

Toxic Amblyopias with Cases.

Dr. G. E. de Schweinitz reviewed the clinical histories and results of treatment in four cases of toxic amblyopia, as follows:

Case I. *Quinin blindness,* the examination having been made twenty-eight years after its onset. At the time of examination, the patient was a woman aged 53, who when 25 years old. took "huge doses of quinin," given during the period of a complication following childbirth. "Total blindness" lasting one month supervened, followed by gradual restoration of vision. At the time of examination, direct vision was greatly restricted for white and colors, and followed the types first described by H. Knapp, in that they were somewhat oval in shape, the long axis being horizontal. There was marked reduction of light sense (less than 1/10 with de Wecker's photometric types). The discs were paper-white and the vessels reduced to threads, and there was distinct arterial perivasculitis.

Dr. de Schweinitz referred to other cases of blindness from this cause, when the examination had been made years after the onset of amaurosis, in one case 35 years; to the vascular changes which he had noted experimentally, and which had been described by a number of authors in the human subject; and to the inconvenience which reduction of light sense, usually permanent, caused, occasionally resulting in a psychasthenic state with serious consequences.

Case II. *Amblyopia in a Dye Worker.* The patient, aged 56, began ten months prior to his examination to note failing vision, which increased. He had stopped smoking, and the use of alcohol. Both discs showed the usual papillo-macular area of atrophy; there were large central color scotomas; vision O.D. 5/30, O.S. 3/60. As long as he remained at his occupation treatment had been unavailing. Gradually, after stopping his work and under the influence of alteratives, strychnia, diaphoresis and negative galvanism, improvement began. After seven months of this treatment, vision rose practically to the normal stand-

ard, 6/9, and the scotomas disappeared, save only for a slight deficiency of color perception directly over the fixing point. While at work, the patient was constantly in contact with anilin dyes (red and blue), and with *bisulphid of carbon;* he also used much sulphuric acid and caustic soda, sulphid of sodium and hydrochloric acid. The patient attributed his trouble to the "noxious fumes" he frequently inhaled.

Dr. de Schweinitz discussed the subject somewhat from the clinical standpoint, with the help of Dr. George Meeker, but as no opportunity for chemical examination of the substances referred to had been possible, this discussion was largely speculative. While it was not proved that this amblyopia was definitely due to these chemicals or their products, Dr. de Schweinitz after very careful examination, could find no other cause, and he thought it likely that the case belonged to the group of amblyopias which are attributed to bisulphid of carbon, which had years ago been so elaborately investigated in England.

Case III. *Tobacco-Alcohol Amblyopia; Relation of Intestinal Stasis.* The patient, a man aged 60, had used alcohol and tobacco excessively, and had a clear history of long standing intestinal disturbance; also of gastric ulcer. Vision O.D. 6/100; O.S. 6/60—; typical scotomas and pallor of the discs. Treatment of various kinds, including a course at Hot Springs, had been followed by slight improvement (the patient probably abstaining from his bad habits for a time), but he had relapsed, and vision continued to fail. At the time of examination, the patient's breath was exceedingly unpleasant, its odor being like that noted in diabetes, but there was no glycosuria, and medical examination revealed notable intestinal stasis, the colon being literally packed with hardened feces. Restoration of the normal intestinal functions, and strict abstinence from tobacco and alcohol resulted in three and one-half months in a return of normal vision and disappearance of the scotoma, a condition which obtains at the present time.

Dr. de Schweinitz discussed in connection with this case the views long ago expressed by Horner and Sachs, that intestinal toxins elaborated from gastrointestinal catarrh caused by the abuse of alcohol and tobacco bore a greater responsibility in creating these amblyopias than either the alcohol or tobacco itself. He emphasized the importance of treatment of the gastrointestinal tract in all cases of toxic amblyopia.

Case IV. *Amblyopia Wrongly Attributed to Lenticular Changes, Really Toxic.* A man, aged 71, who in early life had lost one eye by virtue of an accident, but who had always maintained excellent sight in the remaining eye, began three years ago to note failure of vision, and, Dr. de Schweinitz being absent at the time, he consulted a colleague who found a vision of 6/22 (previously it had been 6/6), a few striae in the lens and slight perinuclear haze, to which the fall in visual acuity was naturally attributed.

Three months later, examination revealed a vision of only 5/150, but no increase in the lens changes, therefore quite out of proportion to the effects of such an incipient cataract formation. The man had all his adult life been a steady, but not excessive, smoker; he did not abuse alcohol. A careful perimetric examination revealed a large oval central scotoma for colors (red, blue and green). His tobacco was stopped, he was fully purged and iodid of potassium and strychnia were exhibited. Very quickly improvement began, and at the expiration of two and one-half months vision had risen to 6/12, and he could read ordinary print with ease.

Dr. de Schweinitz emphasized the importance of perimetric examination, especially of the central area of the field, in all cases of disturbed and failing vision; and also referred to the fact, which he had elsewhere recorded, that occasionally the onset of tobacco amblyopia is postponed until quite late in life, when the subject, altho a steady smoker, is not necessarily an excessive one.

Dr. de Schweinitz also referred to

one patient, seen in consultation, on whom an excellent operation for cataract extraction had been performed by a colleague, resulting, however, in very poor vision. A large central scotoma was found, probably due to abuse of tobacco and perhaps alcohol. The patient had been lost sight of, and more details could not be given. He also referred to a case of toxic amblyopia in a Chinese studied in Dr. Howard's Clinic in Peking, the loss of vision having followed soon after the patient had drunk freely of vinegar in which green peppers had been steeped. The rapidity with which the vision had failed suggested that the vinegar had been contaminated with methyl alcohol, altho as none was available for analysis, this could not be proved.

Persistent Hyaloid Vessels in Canal of Cloquet.

Dr. Hunter W. Scarlett exhibited a girl, aged 21 years, with vision of light perception in right eye since birth; external examination, negative; left eye normal. Ophthalmoscopic examination with sph. + 16. D. lens showed a large grayish-white mass posterior to the lens and slightly to the temporal side. Proceeding from this mass was a stalk which extended back to and was attached to the disc. The size of this stalk was about that of the disc, and contained vessels filled with blood, which reached from the disc to the bulbous expansion in the anterior part of the vitreous. About two d. d. to the nasal side of the disc was a large irregularly shaped white mass with long projecting arms. This was traversed in places by vessels. Several areas of old choroiditis were distributed thruout the fundus.

Parsons describes a somewhat similar condition, as do also Collins and Mayou. Parsons quotes de Schweinitz and Randall as having reported a case some years ago, and gives in detail the various abnormalities that may exist as a result of the remains of vestiges of this structure and in conjunction with it, the most common being colobomas of iris, choroid, and disc.

Charles R. Heed, M.D.
Clerk.

COLORADO OPHTHALMOLOGICAL SOCIETY.

February 18, 1922.

Dr. D. A. Strickler presiding.

Episcleritis.

W. C. and W. M. Bane, Denver, presented a woman, aged forty-seven years, who since the early part of December, 1921, had suffered from an episcleritis of the right eye. There had been a great deal of pain, severe photophobia, lacrimation, and blurred vision. The patient also complained of rheumatism and of having a great deal of gas in the abdomen. There was an earlier history of corneal ulcers. During the present attack, the patient had been instructed to confine herself strictly to a nonstarchy, nonsugar, and vegetarian menu. Her teeth had all been removed seventeen years previously. The upper and outer portion of the eye was deeply injected, and at or near the insertion of the superior rectus were two small whitish elevations, each about one mm. in diameter. Atropin had given the patient only temporary relief. A subconjunctival injection of guaiacol, one c.c. of a one percent solution, had been given twice at an interval of four days. Examination of the nose was negative. The tonsils were diseased, but small. A supplemental report on March 18 stated that atropin had been resumed twice daily, and that Prince's pasteurizer had been used over the elevations three times. Gradually the elevations had disappeared and congestion diminished. Another temporal blister was applied on February 28, and was beneficial in reducing pain. High frequency current, used during March at each visit, had been coincident with a marked improvement in appearance, vision, and comfort of eye.

Discussion.—Melville Black, Denver, favored a free rather than a restricted diet.

W. H. Crisp, Denver, felt that atropin should be used quite frequently, even as often as every two hours.

J. A. McCaw, Denver, suggested that the chest should be examined, and the possibility of tuberculosis considered.

C. E. WALKER, Denver, had seen a similar case in which investigation along every other line had failed, when Dr. O. S. Fowler decided that there was a floating kidney; with the result that after the kidney was fixed the patient got along perfectly well, the eye having now remained quiet for two months.

EDWARD JACKSON, Denver, suggested that application of the thermophore over the nodules might bring about an improvement.

Buphthalmus.

W. C. and W. M. BANE, Denver, presented an infant aged eighteen months, who had been first seen in January, 1921, the parents having noticed that the right eye seemed larger than the left, and that the surface of the eye looked hazy. At that time the cornea of the right eye measured about one mm. more in diameter than the left, the cornea appeared steamy, and the eyeball was hard upon palpation. At a later date the tension was found to be sixty-six mm. of mercury, and the cornea measured twelve mm., while that of the left eye was ten mm. in diameter. A one percent solution of pilocarpin was ordered for use three times daily, but a few months later the tension and appearance of the eye were the same. No improvement was obtained under the use of thyroid tablets prescribed by the pediatrist. The present condition was practically that of a year ago. Should the eye be trephined?

Discussion.—MELVILLE BLACK, Denver: I have been watching a similar case from time to time, and am surprised how little change there has been in the course of several years. In the case which I refer to, both eyes are affected, and I have advised trephining of one eye, being then guided by the result as to the course to be followed in the second eye. In the case here presented, unless symptoms arise, I think a waiting policy would be justified.

W. H. CRISP, Denver, felt that ultimately the eye would probably have to come out; but that, in order to favor the development of the orbit, the eye should be retained as long as there were no objectionable symptoms.

D. H. COOVER, Denver. I have a patient whom I first saw at three years, and who is now six years old. Both corneas were steamy, and the tension as taken with the fingers was plus two. Under eserin, half a grain to the ounce, twice a day, the corneas have become absolutely clear. The eserin is being used regularly.

C. E. WALKER, Denver, was disposed to consider rather operative than medicinal treatment in cases of buphthalmus with high tension; and had obtained satisfactory results from a filtrating scar.

Posterior Cortical Cataract.

J. M. SHIELDS, Denver, presented a man, aged twenty-two years, who had served for three years in Europe in the recent war, and denied having any eye trouble prior to receiving a shrapnel wound over the left eye on June 8, 1918, and a severe gassing the following morning. He stated that after his gassing he had been totally blind for about six weeks, after which the vision had gradually improved for two years or so. The vision was now R. 5/30, L. 5/10. Various tests, including several Wassermanns, urinalyses, and X-rays of the nasal sinuses and teeth, had been negative. There was bilateral posterior cortical cataract, much more marked in the right lens than in the left. There were a good many opacities in the left vitreous. Was the condition due to the war injuries or to a uveitis?

Discussion.—W. C. FINNOFF, Denver. The eye changes from gassing are superficial and due to a local chemical irritation. Possibly this case can be explained on the basis of air concussion, as was reported in regard to a number of cases of injury, without direct contact, from missiles moving at great velocity.

EDWARD JACKSON, Denver. The form of the lens opacity is rather suggestive of trauma, especially in the right eye where the opacity is more definite.

Retinal Detachment.

J. M. Shields, Denver, presented an artilleryman, aged twenty-four years, who dated his ocular disturbance from August, 1918, when he had received a small foreign body in the left eye while he was on duty at target practice. According to his statement, the vision had begun to fail about two weeks after the slight accident, and at the same time he had noticed diplopia, the image seen by the right eye being higher than that of the left. There was a massive detachment of the left retina.

Discussion.—Melville Black, Denver. The retina has not the light color that we get in the average detachment. We have to take into consideration two possibilities, first that this eye contains a foreign body which penetrated the sclera, and second that there is a subretinal growth.

E. R. Neeper, Colorado Springs. If there is a foreign body in this case. I shall be surprised if it is not in the postorbital fat.

Hemorrhage Following Old Ocular Injury; Two Cases.

W. C. Finnoff, Denver, presented two cases of intraocular hemorrhage occuring many years after injury of the affected eye. In the first patient, a girl aged fourteen years, the right eye had been contused by a rock six years previously, the vision being lost at the time of the accident. Two operations, probably needlings, had been done, the last one two years previously. The iris was said to have looked green until a year ago, when it was noticed that it had turned brown. Two months ago it had been noticed that the eye looked red. There had been no pain in the eye since the time of the injury. When the patient was first seen two weeks ago, there was a hyphema filling the lower third of the anterior chamber, and on the iris were several large bloodvessels running toward the pupil. In the upper part of the pupil, a thin bright red mass of blood was seen on the anterior capsule, and a small amount of blood still remained in the lower angle of the anterior chamber.

The second case was in a man aged forty-four years, whose right eye had been injured thirty-two years previously by the back firing of a shell from a rifle. The eye had been contused but not perforated, and after the reaction subsided had had eccentric vision to the right. The patient had been informed that the iris was atrophied on the nasal and lower side. The eye had remained quiet until seven years previously, when circumcorneal injection was noted after exertion. Six years ago the patient had noticed a small hemorrhage in the anterior chamber, which partially covered the visible iris, and which became absorbed in the course of two months. There had been a second hemorrhage two or three years ago, which became absorbed in three weeks; and another hemorrhage a year later, which was absorbed rapidly. Last September, a large hemorrhage developed in the anterior chamber, and in the course of two months the chamber became completely filled with blood. There was a full sensation in the eye, and the blood was absorbed gradually. At the time of presentation, there was a triangular blood clot occupying the lower two-thirds of the anterior chamber. With the corneal microscope, distended new formed bloodvessels were visible above the clot. There were several white masses in the iris stroma.

Discussion.—Melville Black, Denver, thought that in the girl's case there might be a tumor.

C. E. Walker, Denver, favored the removal of this type of eye.

D. A. Strickler, Denver, thought that such an eye would be more useful to the pathologist than to the patient.

Dr. Finnoff. These patients are not willing to have the eyes removed. The question has been raised whether the man has a piece of copper in his eye. If he had, there would probably be changes in the color of the eye.

Microphthalmus.

W. C. Finnoff, Denver, presented a boy aged three years each of whose eyes was microphthalmic. The cornea of the right eye was about five mm. in diameter, that of the left about seven

mm. Each iris presented a typical coloboma down and in, and in the left eye there was a large corresponding coloboma of the choroid. There were also intermittent convergent squint and marked lateral nystagmus. With the left eye, the child could easily detect objects by tilting the head. He was the fifth of a family of six children, the rest of whom were normal. There was no history of congenital disorders in either the maternal or the paternal family. In addition to the ocular defect, the patient presented defective development of the premaxilla on the right side, which left a wide cleft of the upper lip; but the palate was not cleft.

Abscess Metastatic In Eye.

A. C. MAGRUDER, Colorado Springs, reported a case of metastatic abscess at the insertion of the inferior rectus muscle of the right eye, following a carbuncle on the neck. The patient later developed an osteomyelitis of the ischium, which was opened and curetted; and still later eight subcutaneous metastatic abscesses in various parts of the body. Each of these subcutaneous abscesses was unaccompanied by definite pain, but was found by the presence of local tenderness while the patient was being massaged by his nurse. In every instance the pus evacuated from the abscess furnished a pure culture of staphylococcus albus. The eye lesion caused slight redness and fullness of the eye, but no pain; formed a two mm. elevation about four mm. in diameter; and yielded about two minims of pus. There was a definite slough which came away after three days, the wound promptly healing.

Discussion.—W. H. CRISP, Denver, referred to a case of metastatic abscess in the background of the eye, reported by W. T. H. Spicer in the transactions of the Ophthalmological Society of the United Kingdom for 1907.

E. R. NEEPER, Colorado Springs, referred to two cases of metastatic abscess which he had encountered in his own practice. One was in a negro who finally died of meningeal symptoms. The anterior chamber gradually filled with yellow pus without any prodromal uveitis. The primary focus was probably in the neck. The second case was in a white woman who was opened up at perhaps as many as twenty-five to fifty points in various parts of the body, but finally got well. There was a bulging of the conjunctiva and of Tenon's capsule, and a few days later the anterior chamber was full of pus and the eye had to be removed. In this case the primary focus was in the arm.

D. A. STRICKLER, Denver, suggested investigation of the question of hypothyroidism in Dr. Magruder's case.

EDWARD JACKSON, Denver, suggested that the pus from Dr. Magruder's case should be tested as to whether it would produce the same condition in animals.

W. C. FINNOFF, Denver, suggested injections of foreign protein, three to five c.c. of sterilized milk, subcutaneously, or intragluteally, every day or every other day.

WM. H. CRISP,
Secretary.

SAINT LOUIS OPHTHALMIC SOCIETY.

Meeting October 28, 1921.

DR. A. E. EWING Presiding.

Amblyopia Ex Anopsia.

DR. WM. H. LUEDDE read a paper, to be published in full in this journal.

Discussion: DR. J. W. CHARLES. In spite of Dr. Luedde's limitation of his subject to "Ex Anopsia," one cannot avoid wondering how many of the so-called "Ex Anopsias" are not the result of retinal hemorrhages caused by pressure in the head at birth, which absorb so completely that later the ophthalmologist can find no trace of a lesion. In 1895 Professor Heller, pathologist of the University of Kiel, turned over to me an eye of a new born child, removed in a postmortem examination. The retina was hemorrhagic in almost every section. In looking up the literature, I found a report of over twenty such cases. Since the time necessary for recovery of vision and fusion ability varies so greatly,

how can one tell how long to continue treatment? For this reason one of Dr. Luedde's cases is exceptionally interesting.

Membranous Cataract.

Dr. Hayward Post: A girl, E. B. C., aged 15, came under my notice April 16, 1920, who had pupillary membranes in both eyes, so dense that vision O. D.—fingers at one foot; O. S.—fingers at three feet. Both membranes were needled, resulting in a gradual improvement of vision. Immediately following the operaton there was considerable confusion and embarrassment, as common objects, such as pen knives and letters of the alphabet, were not recognized. This knowledge has gradually been acquired, so that the patient is much more capable of taking care of herself. But on the whole the result has been rather disappointing, as at present, a year and a half after the first operation, the vision with correction is only 3/192, either eye.

Chronic Simple Glaucoma Without Increased Tension.

Dr. Hayward Post presented the following: K. W., female, eighty-two years of age, reported first on December 1, 1920, complaining of loss of vision, for which she desired a change of glasses. Vision, either eye, with or without glasses—18/38. Ophthalmoscope showed O. D. 4 diopters, cupping with definite breaking of the course of the vessels at the disc margins. O. S. slight pallor of disc; 1.5 diopters cupping. Attempts to map the field of the right eye were never successful. The field of the left eye was contracted and had a typical paracentral scotoma. Schiotz tonometer O. S. 17 mm. Hg., O. S. 19 mm. Hg. This condition has not varied during the course of the treatment, tho the tension has been taken and the left field has been mapped many times, and at different times of the day. Unfortunately no color fields have been taken. Pilocarpin has been used three times a day. Dr. Hardy reports that an examination of this patient nearly five years previously showed a similar condition.

Fuchs states that iridectomy and miotics are of little value in these cases. Elliot believes that trephining is of no value. Horstman is of the opinion that they are cases of simple optic atropy. Personally, I am inclined to think that normal pressure will produce glaucomatous changes in certain eyes where the tissues are of subnormal resisting power and that such is the condition of this case.

Discussion: Dr. J. W. Charles. Why is it that in glaucoma with a comparatively low intraocular pressure we frequently see a deep cupping of the disc, while in other cases with high pressure the cupping is more shallow? It would seem that in some eyes the lamina cribrosa is more resistent than in others; yet according to Elliot the problem is more complex and the sequence, from the notes of four cases of Fuchs' would seem to be (1) Disappearance of the delicate anterior glial fibers. (2) Disappearance of the deeper glial fibers in the lamina. (3) Bending backward of the connective tissue lamellae of the lamina. (4) Compression, sclerosis, even thickening of the lamina; and (5) thinning and atrophy of the lamina as a result of continued pressure.

Dr. Lawrence Post. That the possibility of a tempory elevation of tension at some earlier period may have been the cause of the signs and symptoms in such a case of glaucoma as the one described by Dr. Hayward Post, is well illustrated by a patient whom I have been watching for the past four months. L. N., 26 years old. Past history: Health always good. Four years ago had an attack similar to the present one in every respect except that there was a complete (?) recovery in two months. Present illness: Three months previous to consulting me there began a slow loss of vision in right eye entirely without pain. Vision equalled ability to count fingers eccentrically at one foot. Marked glaucomatous cupping of disc. Tension, right eye, 42; left eye, 12 (Schiotz). After using pilocarpin grs. 1/240 every four hours for two weeks there was no change in tension. The strength of the pilocarpin was increased to grs. 1/20 and after two weeks the tension was O.D.

20 and O.S. 20. One month later tension was O.D. 12; O.S. 12. The drug was then reduced to grs. 1/240, three times a day, and after two weeks the tension was O.D. 12; O.S. 17. The pilocarpin was further reduced to grs. 1/480 once a day. Two weeks later the tension was O.D. 16 and O.S. 13. I feel that the eye has just passed thru another period of high tension and will go along now for a time with normal tension without any miotic. The field in the left eye was reduced one-quarter when first seen, but at no time has there been other evidences of disease in this eye.

The youth of the patient and the long intervals between the unexplained elevation of tension makes the case of interest, the latter feature illustrating the necessity of considering, in cases of apparent glaucoma without increased tension, the possibility of these having been increased in the past life of the patient.

Increased Hyperopia in Diabetes.

Dr. Hayward Post presented C. F., female, aged fifty-seven, who had been a patient at the office for about thirty years. February 1, 1915, patient was given a slight change in glasses:

O.D + .25c. Ax. 180° V=20/15.

O.S. + .75c. sph. ⊃+0.87c. Ax. 180° V=20/15.

She required + 2.25 added for reading. Later she reported blurred vision, with glasses, O.D. V 20/96; O.S. V 20/120. The ophthalmoscope showed slight hyperemia of discs and retina, confirmed by Dr. A. E. Ewing. Dr. H. W. Soper reported that one month previously he had found sugar in the urine, but that she had now been sugar free for the past three days, but that there were still large quantities of acetone and diacetic acid.

On October 10th vision O.D. with +0.75 sph. added to present glasses, was 20/15 and O.S. with +1.00 sph. added, 20/15. +2.25 sph. was still required as a reading addition. By November 20th, the patient still remaining sugar free, the additional hyperopia had disappeared, and the vision, either eye, was 20/15.

Case II. Mrs. J. T. Mc., female, aged sixty-one, was given

O.D. + 3.00 d sph. + .75c. Ax. 45° V 18/24.

O.S. + 2.75 d sph. + .75c Ax. 132° V 18/15.

With + 3.00 sph. added for reading. Later, glasses not satisfactory; O.D. V 18/60; O.S. V 18/19. The ophthalmoscope showed some edema of either retina and the normal physiologic cups were absent. She stated that she is under treatment for diabetes. With + 1.00 sph. added, O.D. V 18/30.

I told her to await developments and and report in about one month but have not seen her since.

Fuchs states that there are two main causes for hyperopia in diabetes;

1. Increased refractivity of media.

2. Shortening of the eye ball which may result from tumor or edema under the retina. The probabilities are, that increased hyperopia in these cases is due to edema of the retina.

Discussion: Dr. J. W Charles. In a recent discussion by the Ophthalmological Society of the United Kingdom, of "Ocular Disturbances in Diabetes," Garrod stated that the theory that the cataract of diabetes is caused by osmosis from the lens because of the amount of sugar in the blood, is no longer tenable; because the amount of sugar in the blood is too small and also sugar has been found in the lens. It would seem, therefore, that Dr. Post is correct in excluding lens changes from the possible causes of his case.

Changes in Refraction.

Dr. Lawrence Post presented a statistical report in patients observed over a long period of years.

John Green, Jr.,
Editor.

ST. LOUIS OPHTHALMIC SOCIETY.

November 25, 1921.

Dr. A. E. Ewing, Presiding.

"Ophthalmic Illuminator."

Dr. W. E. Shahan presented this new instrument.

Subnormal Accommodation.

Dr. J. F. Shoemaker presented case reports as follows:

In January, 1905, Dr. Geo. M. Gould

published a paper on "Subnormal Accommodation and Premature Presbyopia," reporting twenty-seven cases, illustrating the subject.

He said: "Many of our puzzling nonsuccesses are due to failure to recognize insufficient or paretic accommodation or premature presbyopia. There is no test by which the fact may be learned, because for the time required in the ordinary tests there is almost always the ability to hold the vision perfect, or seemingly so, by an effort which exhausts with long continued reading, writing or sewing."

The following two cases appear to belong in this class:

Case I. J. B. M., aged 20, consulted us in July, 1918, complaining of eyes burning and feeling dry.

V.O.D.—18/30=Jaeger No. 1 at 3".

V.O.S.—18/30=Jaeger No. 1 at 3".

Under homatropin cycloplegia:

V.O.D. w—1.00 S.⊖+1.75 C. ax. 90° =18/15.

V.O.S w—1.50 S.⊖+2.75 C. x. 90° = 18/15.

These glasses were prescribed for constant use and he was given some drops to use. The muscle test showed orthophoria for distance; 10 degrees exophoria for near.

A month later he complained that his near vision blurred in the afternoons and eyes still felt dry. Drops were continued. After two weeks more, near vision still blurred and head ached some the latter part of the day. Pilocarpin gr. 1/6 to the fluid ounce was added to the collyrium t.i.id. Three weeks later eyes were better, but still had headaches when he used eyes during evenings. Pilocarpin was increased to gr. 1/4 to the ounce.

This relieved the headaches and his near vision was good. For a period of six months he got along nicely so long as he used the drops, but N.V. blurred and head would ache the latter part of the day if he stopped them.

After six or eight months, he got along nicely by using the drops once or twice daily, and a little later was able to discontinue them entirely with no further trouble.

Miss B. W., aged 22, came complaining of pain in eyes, forehead and occiput. She was wearing +1.00 S.⊖+.25 C. ax. 180°, right and left, with which she said her distant and near vision were good.

Under homatropin cycloplegia she accepted:

O.D. +1.00 S⊖+.25 C. ax. 180° =18/15.

O.S.+1.25 S.=18/15.

In the postcycloplegic examination she accepted:

O.D. +1.00 S.⊖+.25 ax. 180° giving her 18/12 vision and Jaeger No. 1 at 4".

O.S. +1.00 S. giving 18/12 vision and Jaeger No. 1 at 4".

She had practically orthophoria.

These glasses were given her. She was referred to a rhinologist who reported hypertrophy of both middle turbinates.

Six weeks later she reported that she could not read any length of time without it making the back of her head ache. She was given drops with one-fourth grain pilocarpin to the ounce to use three times daily.

Three months later she reported that her eyes were more comfortable; but that she got a pain in the back of head as soon as she read or sewed, or when travelling in car. Thinking that while the test showed normal accommodation there might, nevertheless, be a weakness of the ciliary muscles which caused trouble when eyes were used continuously for near work, I placed a +1.25 S., right and left, over her distance glasses and had her sit in the waiting room and read. With these additional glasses she read with perfect comfort for two hours, not having a trace of the usual occipital headache. Accordingly she was given

O.D. +2.25 S.⊖+.25 ax. 180°.

O.S. +2.25 S.

for near work. Several days later she stated that she had read as long as three hours continuously without any headache.

Two and one-half years later she reported that she had worn the reading glasses with perfect comfort for about one year and then had gotten along comfortably with the distance glasses, until two months previously when she began to have occipital headaches again. As she had broken her glasses she was given her full distance correc-

tion and some pilocarpin drops, and presumably she got along comfortably with these as I have not heard from her since.

Edema of Lids Due to Endocrin Disturbances.

Dr. J. F. Shoemaker said numerous observers have reported conjunctivitis and excessive lacrimation occurring in patients after removal of the thyroid glands, and also in myxedematous patients. The following two cases had these symptoms and in addition another worth while noting, viz.: swelling, or edema of the eyelids. This last symptom is one that might be expected to occur in patients whose thyroid glands were secreting much under the normal amount of thyrotoxin, as in myxedema there is often much thickening and swelling of the skin, to such extent even as to decidedly change the patient's expression and appearance.

The first patient, Mrs. J. R. C., consulted me suffering with a chronic conjunctivitis and considerable lacrimation. She stated that she had been having frequent colds in head. Blood pressure was 165. She was treated for the conjunctivitis several weeks and improved considerably but did not get entirely well. Six weeks later she returned with eyes watering and lids swollen and edematous. She was referred to an internist for examination, especially as to her endocrine secretions.

His diagnosis was (1) general arteriosclerosis; (2) hypopituitarism, posterior lobe, with hypothyroidism; (3) hypertension (systolic 195). He prescribed thyroid gland, and pituitary substance (entire gland). After two months of endocrine treatment he reported that the general endocrine symptoms had improved very materially and her blood pressure had dropped from 195 to 150 systolic. The swelling of the lids soon disappeared with the improvement of the other symptoms.

Case II: Mrs. B. Y., consulted me in November, 1920, stating that the past four days eyelids have been swollen. There was considerable edema of both upper and lower lids of both eyes, it being worse on the left side where the swelling extended over the malar bone. The skin seemed stiff and leathery, not pitting on pressure. There seemed to be a slight dermatitis, yet hardly sufficient to produce so much swelling. She also had a conjunctivitis. I gave her some drops for this and a lotion for the swollen lids. As the condition had not improved any after several days, but was rather worse, she was referred to a dermatologist who treated her for some time with no improvement. An examination by a rhinologist showed no condition in the nose that could be responsible for the trouble. The urine was found to be normal.

She was referred to an internist who found that she had marked hypothyroidism. Under treatment of this condition the swelling of the lids, which had persisted several weeks in spite of local treatment, very quickly subsided.

In cases of edema of the eyelids, when searching for the cause, aside from any local causes which might be responsible for the condition, we think of involvement of the kidneys, chronic arsenical poisoning and trichinosis. It would seem advisable to keep hypoendocrinism in mind also as a possible etiologic factor in these cases.

Pigmentation of Conjunctiva of Lids.

Dr. W. A. Shoemaker presented case reports as follows: Mrs. S., aged 61, consulted me in May, 1919, on account of poor vision for distance and for reading, and on account of some burning of the lids.

The ophthalmoscope revealed incipient cataract in both eyes. The burning of which she complained was due to a chronic catarrhal conjunctivitis. Blood pressure and urine normal. General health good. Lenses were prescribed, and she was given a zinc and boric acid solution for her conjunctivitis.

In September, 1920, she reported that recently her eyes had been watering, felt rough and were sensitive to light. Upon everting her lids the palpebral conjunctiva which had been perfectly smooth was found to be thickly dotted with small blackish deposits, only a little of which could be rubbed off. A zinc sulphat and boric acid solution was again prescribed. On October 18th the deposits were more numerous and more prominent. The

conjunctiva looked as if black pepper had been sprinkled on it. On November 5th, under cocain, the lids were thoroly rubbed with cotton pledgets dipped in 1/5000 bichlorid of mercury solution. Most of the deposits were removed by this procedure. A piece of pigmented conjunctiva was excised and it with some of the separated pigment, was given to Dr. Buhman, the pathologist, for examination.

Boric acid ointment, 15 gr. to the ounce of white vaselin, was freely applied and the eyes bandaged. The same treatment was applied daily for three days. On the fourth day she was allowed to go home, with instructions to use white silver (Hille) three times daily. Two weeks later she reported that her lids no longer felt rough, did not water and her eyes were no longer sensitive to light. The conjunctiva was looking very much better but there was still a good deal of pigment below the surface.

The same treatment was continued and on January 6, 1921, she reported that her eyes had been feeling perfectly comfortable. Only a few pigment spots were left on the conjunctiva; in the right there were quite a number, but none on the surface.

Ten months later she reported that she had used the white silver for one month and since that time had used nothing, as her eyes felt perfectly comfortable. Only a few very small pigment spots could be seen and the conjunctiva was smooth.

Dr. Buhman's report is as follows:

"Sections from the specimen submitted show some edema, a rather large amount of lymphocytic and some leucocytic infiltration. There is some yellowish brown granular pigment present in several areas. This pigment seems to be extracellular and is no doubt blood pigment. Cultures of the pigment on blood serum causes liquefaction of the media. The organism was, in pure culture, a long fat bacillus, gram positive, actively motile in young culture and proved to be the bacillus subtilis." The pigment under the microscope is a blackish brown amorphous looking substance.

Serous Cyclitis Caused by Diseased Teeth.

Dr. W. A. Shoemaker reported on A. T. C., aged 22. November 11th gave the following history:

Seven years ago the right eye had an attack of iritis which lasted several weeks and promptly subsided after the extraction of a tooth. Last June he developed an iritis in his left eye which also promptly got well after having a tooth extracted. On October 19th the left iris again inflamed.

On November 2nd he had severe serous cyclitis, with moderate iritis; upper lid edematous, marked lacrimation and photophobia. The eye was extremely sensitive to touch over the upper ciliary region and there was a marked descemetitis. The vitreous was somewhat hazy but no exudates were discovered. Pupil widely dilated. An X-ray of the teeth showed a diseased upper left biscuspid which was removed. Wassermann negative, Iodid of potassium and bichlorid of mercury were prescribed. Hot applications were ordered and the pupil was kept widely dilated with atropin.

November 5th the eye showed decided signs of improvement. November 11th it was less sensitive to light, ciliary injection was less marked and he had no pain. November 19th there was very little ciliary injection, the descemetitis was clearing and his vision, with correction, was 22/30. The vitreous was apparently clear. The acuity of vision was no doubt lessened by the descemetitis still present.

Mrs. W. S., aged 30, came November 23, 1920. For the last four days her eye had been sore and sensitive to light. Examination revealed decided ciliary injection with a very sensitive spot in the ciliary region under the upper lid. The iris reacted promptly to light and convergence. The pupil dilated promptly with a drop of atropin. There was a marked descemetitis. Vitreous fairly clear, no exudates. Wassermann negative; dental roentgenograph showed an apical abscess of the upper molar, upper left bicuspid and lower left first molar. These teeth were extracted. The pupil was kept dilated with atropin and hot applications were made. Bichlorid of mer-

cury and iodalbin were given internally. November 30th the tender spot in the ciliary region and the ciliary injection had disappeared. Decemetitis less marked. December 23rd, no trace of descemetitis, vitreous clear, no exudates and vision is normal.

September 24, 1921, she reported that for the last five days her right eye had been sore to the touch and a little bloodshot, and that vision was somewhat blurred. Examination revealed a tender spot in the ciliary region, ciliary injection, and an active pupil. A diagnosis of serous cyclitis was made. She was put on the same treatment as in the previous attack. Another X-ray picture showed so many diseased teeth that her dentist advised having them all removed. After the teeth were removed the eye steadily improved and by October 19th was normal.

JOHN GREEN, JR.,
Editor.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

FEBRUARY 20, 1922.

DR. HILLIARD WOOD, PRESIDENT.

Intraocular Hemorrhage Following Vaccination.

DR. E. L. ROBERTS presented a girl, R. H. aet. 10, with internal strabismus of the left eye; vision never better than 20/200. Four years ago he fitted the patient with proper glasses. One month ago the patient was vaccinated, and as the arm became sore, a very similar sore developed on the left, lower lid; the cornea became somewhat hazy; and anterior chamber filled with blood. Tension slightly subnormal. Present vision only perception of light.

Discussion.—DR. E. B. CAYCE.—In all cases of doubtful diagnosis a Wassermann is always in order, and one should be made in this case, as it might possibly throw some light on the condition. This case was one in which, in the beginning, there was a strong indication for the injection of the cyanid of mercury, as the important thing is to get absorption at the earliest possible moment, and such absorption is most readily promoted by a violent reaction of the eye.

DR. GEO. H. PRICE.—Had there been a very marked reaction or inflammation about the eye, with patient sick from the vaccination, there might be some connection between the two; but in the absence of such symptoms the occurrence of the hemorrhage at this time was purely accidental. He suggested, however, the possibility of the patient's having scratched the arm, and then the eye or lid, thus carrying infection.

DR. FRED E. HASTY was inclined to the belief that the hemorrhage following vaccination was merely a coincident. He would deal with this as with an eye which had been injured. He would advise clearing up all possible foci of infection, even in the presence of a strongly positive Wassermann, as he believes that many mistakes are made in attributing pathology to plus Wassermanns and overlooking other contributory causes.

Intraocular Hemorrhage, Vascular Loop.

DR. E. B. CAYCE presented Mr. F. H. C. aet. 57, traveling salesman. General history irrelevant. September 19, 1920, stooped over suddenly and at once realizing that he had lost vision of left eye. Went to the Vanderbilt Hospital, where his condition was diagnosed as intraocular hemorrhage. General physical examination, including a negative Wassermann made. Urinalysis showed rather high percentage of sugar, which cleared up in a few days under appropriate treatment, and he has been almost entirely free from sugar since.

Dr. Cayce first saw patient February 20, 1922. R. Eye: V. 12/20; field of vision contracted—(See field); beginning optic atrophy. L. Eye. V. nil. Fundus shows typical optic atrophy, with very unusual appearing fundus in one particular, viz., that there is a vein that apparently comes with the central artery and extends towards the nasal side about one-half of the diameter of the nerve head, and then loops back and enters the nerve head at almost the same point. The condition, in his

opinion, is one of the smaller vessels, the enlargement of which has persisted, and it was formed in nature's effort to perfect a collateral circulation. He judges that the condition is not an anomaly from the fact that the other fundus is apparently normal. (See Fig. 1).

Dr. Cayce said that his motive in presenting this case was two-fold: (1) to show the unusual condition in the left eye, with beginning similar condition in the right; (2) to show the fundus drawing, which had been made by a local artist who is being trained by him in the use of the ophthalmoscope.

Fig. 1. Vascular loop in left eye of F. H. C., patient of Dr. Cayce.

Discussion.—Dr. Hilliard Wood said that in his opinion the formation of this new vessel followed hemorrhage. It impressed him as being one of the types of retinitis proliferans, in which the vessels develop from blood clot, projecting forward in front of the normal plane of the retina, and being hyperopic in their refraction as compared with the general fundus. The few cases he had seen followed hemorrhage, and this impressed him as being one of that type. The fact that the trouble seems to be developing in the other eye would indicate that it is primarily due to diabetes, as there is no history of hemorrhage in the right eye.

Dr. Geo. H. Price was of the opinion that the condition was merely an anomaly.

Unusual Sequel of Creasote Burn.

Dr. James P. Crawford presented a colored boy, W. H. aet. 19, a pupil in the Tennessee School for the Blind. Eyes claimed to be normal until 6 years ago, when patient was creasoting lumber and dropped a plank into a tank of creasote, the creasote splashing into both eyes. The accident was followed by inflammation and loss of vision of each eye. Patient claims his eyes and vision were normal to the time of accident.

Fig. 2. Field of vision of F. H. C., showing irregular contraction.

Examination shows marked enlargement of each eyeball, the enlargement involving not only the cornea, but the sclera. At first glance it appears to be a case of buphthalmos, but closer examination shows the absence of the anterior chamber in either eye, the iris being adherent to and largely merged with the more or less opaque and scarred cornea. In each eye the cornea protrudes abnormally forward when the eyes are opened, but when closed the lids cover each cornea fairly well. There is no pain; no irritative symptoms; no vision in either eye. Dr Crawford's theory was that the creasote burn produced ulceration of each cornea, which is indicated by the scarring and thinning out of the cornea. In the doctor's opinion there is a question whether this was originally buphthalmos, or whether a pseudobuphthalmos really due to the creasote burn.

Discussion.—Dr. Hilliard Wood said

that the question seemed to be whether this condition was one of staphyloma or buphthalmos. In his opinion buphthalmos seemed to be excluded, as buphthalmos is congenital, and this patient claims to have had good vision until the time of accident. The amalgamation of cornea and iris indicates former ulceration, and not buphthalmos. In the latter condition the anterior chamber is abnormally deep, whereas in the present case it is obliterated.

Dr. Herschel Ezell was of the opinion that this was a case of buphthalmos. He believes the patient to be honestly mistaken in his statement that the vision was good up to the time of the accident.

Dr. Geo. H. Price commented upon the absence of symblepharon, saying that in his opinion a creasote burn sufficient to have produced this amount of pathology would have also produced pathology about the lids, with adhesion between the conjunctiva of the lid and the globe. He said that while he had seen a great many creasote burns, he had never seen one producing corneal ulceration. He looked upon the scar of the cornea as a congenital condition. Regarding the patient's statement that his vision was good previous to the accident, Dr. Price thought that this could not be relied upon, as seeing is relative, and no matter what the degree of vision to which a patient may be accustomed, he believes that he sees as well as others.

WILLS HOSPITAL OPHTHALMIC SOCIETY.

January 3, 1922.

Dr. Burton Chance, Chairman.

Interstitial Keratitis.

Dr. William Zentmayer showed a case of interstitial keratitis with nodules at the angle of the anterior chamber, which he considered to be true gummata. Dr. Schwenk thought these might be tuberculous nodules; but that the use of inunctions of mercury was the proper treatment.

Hemorrhages into Anterior Chamber.

A case of recurrent hemorrhages into the anterior chamber on the service of Dr. McCluney Radcliffe was shown. This case was one of an old iridocyclitis. Dr. Zentmayer stated that he had seen one case of spontaneous hemorrhage in the anterior chamber about twenty years ago but has not seen another since—he thought this condition was due to degenerated blood vessels of the ciliary body from a previous inflammatory condition.

Bilateral Ptosis.

Dr. Louis Lehrfeld, reported on Miss R. L. age 14, colored. Noticed drooping of both eyelids but more rapid and extensive of right, for three years. Always had poor vision in right eye, but drooping of lid became so extensive as to completely obstruct vision.

On October 1, 1921, first examination showed a ptosis of right eyelid covering two-thirds of cornea, obstructing view of pupil, left eyelid covered one-third of cornea. There was not a complete paralysis of the levators, as there was a distinct but retarded elevation on superduction. The other extraocular muscles were normal in action in all directions, and pupillary reactions were prompt.

The family history and laboratory tests gave no assistance in determining the etiology. The general physical condition was good and the patient showed a high grade of mentality in comparison to the lethargic physiognomy caused by drooping lids. The skin and subcutaneous tissue appeared to be loose and excessive; and by process of elimination as to cause, a diagnosis of *blepharochalasis* was made.

On October 8, a Tansley-Hunt operation was performed in which a tongue of skin was drawn thru a subcutaneous tunnel under the eyebrow, and was anchored by deep sutures to and beneath the skin of the forehead. As there was a partial ptosis of the left, the suspending lip of skin was not cut very short. Ten days following the operation the sutures were removed. The success of the operation was not at first apparent, but when swelling subsided, there was an elevation parallel with the left lid which has since become stationary in its ptosis and apparently follows the right lid.

C. S. O'Brien, Secretary.

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GONOCOCCUS OPHTHALMIA OF EGYPT.

As ophthalmia of the new born infant, infected at birth, and of the adult, usually infected with cocci that have developed in the urethral epithelium, this disease occupies a large place in the literature of ophthalmology and in the thought of the ophthalmologist. The cases that develop under other circumstances, and thru other channels of infection, have not received the attention they deserve. It is well understood that this disease is always dangerous to sight. But not that, comparatively, it is much more dangerous to the adult than to the infant; that of infected adults a much larger proportion become blind under good treatment, than among infants treated as early and as efficiently.

From this point of view the cases that occur in childhood, but not from birth infection, like that reported on p. 371, are of especial interest. They are rare in this country, but in some other parts of the world are very common. The purulent ophthalmia of Egypt is a gonococcus ophthalmia. The impression to this effect has recently been confirmed by the work of Beaton. (Report of the Director of Ophthalmic Hospitals, p. 403.) Beaton found that the Gram negative diplococci, contained in the purulent discharge from these cases, "differed in no way from the characteristic aspect of gonococci in gonorrheal pus." Under the same conditions and with the same difficulty, they gave colonies having the same appearance, and gave the same reactions, producing acid from glucose but not from maltose. These characters, and still more the conjunctival reaction, the clinical characteristics of the conjunctivitis they cause, identify these organisms as gonococci, and distinguish them from other cocci presenting the same appearance under the microscope, as the micrococcus catarrhalis, the meningococcus, etc.

Of the cases of acute conjunctivitis in Egypt, the gonococcus causes almost as many as all other organisms together, 1657 against 1007 caused by the Koch-Weeks bacillus, 515 by the

Morax-Axenfeld bacillus, 102 by the pneumococcus. To quote, from the report above alluded to, the words of the Director, Dr. A. F. MacCallan:

"There is considerable difference between gonococcal conjunctivitis in Egypt and in Europe. In the first place, the origin of the condition in Egypt is almost invariably the result of contagion acquired from the conjunctival discharge of a neighbor, whereas in Europe it usually has a venereal origin. This does not mean that gonococcal urethritis is uncommon in Egypt. In the second place the gonococcal conjunctivitis met with in Egypt is characterized by the frequency of subacute and chronic forms. Thirdly, there is a definite seasonal variation in the incidence of gonococcal conjunctivitis: increased prevalence being markedly influenced by the rise of atmospheric temperature, which occurs annually in the spring, as shown in my last report. Fourthly, the disease when treated is apparently less destructive than in the cases I remember when house surgeon at the Royal London Ophthalmic Hospital. Whether this is because we treat it more skilfully, or because the gonococcus is less virulent, or because the reputed gonococcus of Egypt is not the gonococcus at all, but another morphologically similar organism, remains to be decided."

The evidence before us seems to indicate that the organism in Egypt is exactly the same as the gonococcus of Europe, altho we are coming to understand that different strains of the same species of bacteria may show differing pathogenic activities. In the new born, the gonococcus yields to treatment in a large proportion of cases, and in Egypt a large part of the cases occur in young children between 1 and 5 years of age (Meyerhoff).

The share which flies take in spreading the disease is still unsettled. The traveler in Egypt who sees them walking undisturbed over the eyes of young children, and apparently unfelt, is struck with a common insensitiveness of the eyes to the contact of foreign bodies, that may play a very important role in the implantation of the virus from discharging eyes upon those not previously affected. The impression is that flies are a very important factor in the spread of the disease, but more exact knowledge with relation to the particular flies in question is needed. The study of gonococcus conjunctivitis, where it is epidemic, should give material help in dealing with the occasional cases that occur in many parts of the world.

E. J.

GRADUTE TEACHING OF OPHTHALMOLOGY.

The attendance upon the courses of lectures given by Prof. Fuchs in various parts of the United States is a new and very striking illustration, of the desire of ophthalmologists to fit themselves as well as possible for their chosen work, and the enthusiasm they feel for all the learning they can get regarding it. An even more spectacular display of this enthusiasm was the gathering of 500 ophthalmologists and oto-laryngologists in Philadelphia in October, for a three days' intensive course of lectures and demonstrations in connection with the meeting of the American Academy of Ophthalmology and Oto-Laryngology.

But there are other manifestations of this spirit. For more than a year the Colorado Ophthalmological Society has held, on the day of each of its meetings, a series of demonstrations that have been attended regularly by most of its members; and among the best appreciated have been those on the normal and pathologic histology of the eye. The Pacific Coast Oto-Ophthalmological Society had clinical and other demonstrations in connection with its last annual meeting. The Kansas City Eye, Ear, Nose and Throat Society has arranged operative teaching clinics, that have been very popular. The attendance on the summer course in the University of Colorado has increased, until it has about reached the limit that institution can provide for in its present quarters. The University of Pennsylvania was unable to accept

all who desired to take its graduate course in ophthalmology, lasting thru the year.

There can be no doubt, that only the difficulty of leaving practice for long periods prevents many competent practitioners of ophthalmology from making themselves more competent, by courses of study carried on with the assistance that skilful demonstrators and lecturers can give. Every effort should be made to carry this kind of help to the mass of ophthalmic practitioners, and especially to those who practice alone in the smaller cities and towns, where there is no assistant and no other specialist to whom patients might be referred, during any considerable absence in pursuit of graduate study.

A three days' intensive course in connection with an annual meeting may be helpful and inspiring; but it would have to be repeated for a hundred years to furnish the equivalent of one year devoted to graduate study. Prof. Fuchs' lectures have been most valuable to those who could attend them. But he had invitations to give his course other places, which he could not accept; and not one-tenth of the ophthalmologists of the United States will be able to hear them.

The opportunities for graduate study of ophthalmology must be placed on a broader basis, to meet the need of the time. There are many medical schools in which short courses of training could be given on special subjects, if the need for it were more widely understood and insisted on. There are probably a hundred ophthalmologists in this country each capable of studying a particular topic or branch of ophthalmology, until he could give one or more very interesting and instructive lectures upon it. These lectures could be repeated at many points, wherever there might be a group of ophthalmologists gathered to hear them. They should be given on a basis of adequate compensation. But a part of that compensation would be the satisfaction of teaching, and the increased respect of one's colleagues that always arises when such work is well done.

The practical thing to do is to pick out some subject you would like to know more about. Study it in every way you can and arrange systematically what you learn. Write out what you would say in explaining the facts; then do some more studying about them, and again write down what you think would make them clear. Get up, by photography and drawings, either by yourself or by the help of others, all the diagrams and pictures that would help make your views easily understood. Offer your material first as a paper or address before some society, and if you have put the right work into it, other opportunities to use it will arise. Even a single demonstration or lecture, carefully worked up, can be made a real service to your profession.

E. J.

A NEW JOURNAL

A recognition of the difference between science and trade seems to be extending among the optometrists. The Keystone Publishing Co., for many years the publishers of THE KEYSTONE, have undertaken the publication quarterly of THE ARCHIVES OF OPTOMETRY. According to the Editor: "Optometry today is a recognized branch of general science; the practice of optometry, a professional vocation of comparatively definite nature. Today's duty is to perfect the science, improve the practice and determine more exactly the scope and character of what shall be properly comprehended in this science and practice. At this stage of development, a scientific journal is essential to the advancement of that ideal now taking definite shape in the mind of the forward looking optometrist."

The first number, bearing the date of January, 1922, is a neat attractive looking journal of 56 pages, printed in large clear type, with illustrations. The articles are such as will appeal to and serve the optometrist. They are arranged under the headings, Original Papers, Editorials, Diagnosis and Treatment, Book Reviews, Abstracts and Notes. The advertisements are confined to advertising pages.

The subjects of the original papers are: Development of Visual Acuity and Ocular Dynamics; The Object of Ocular Calisthenics; Anomalous Accommodation; Test Chart Usable with or without Distance Doubling Mirror (using only letters that are laterally symmetric); and Significance of Exophoria at Reading Points in Presbyopia.

E. J.

BOOK NOTICES

Papers to Be Presented Before An International Congress of Ophthalmology. Washington, D. C., April 25-28, 1922. Octavo, 522 pages, illustrated. Philadelphia, 1922.

More than anything else that has yet transpired, this volume gives substance and reality to the Washington Congress, that will have been held and passed into history before this reaches our readers. It has been printed in excellent form and reflects great credit on the committee that published it. Their names do not appear in the volume, but they are William Zentmayer and William E. Sweet of Philadelphia and Arnold Knapp of New York. Dr. Zentmayer and also Sweet, on whom the chief burden of editing the volume fell, especially deserve to have it known who has done this good work for the ophthalmologists of the United States.

Of these papers there are 40 from the following countries; Sweden, Belgium, Jugo-Slavia, Tunis, Chile, Peru, Cuba and Canada each 1, Mexico 2, France and Spain each 5, England 7, and the United States of America 13. In addition, there are 3 propositions to be laid before the Congress for its endorsement. The series of 4 formal addresses, about 20 demonstrations, and the entertainments that will occupy part of the time of the Congress are not mentioned. Altho certain nations are conspicuous by their absence from this list, it is as widely representative of the nations of the world as any International Congress that has ever been held. On account of the large number of papers offered nearly as many had to be declined as could be accepted, and from the United States more than two-thirds had to be declined.

Of these papers, 7 are published in French, 7 in Spanish and the remainder in English; several of the French writers, and several from other European countries and from Latin America having chosen to write in English. It has always been the case with preceding international congresses and rightly so, that the bulk of the papers were written in the language of the country in which the congress was held; and with which the largest proportion of members were most familiar.

Comparison with the presession volumes of other international congresses is entirely favorable to this one. It has a table of contents, an index of authors, is better printed and bound; and includes all the papers to be presented, not merely a few that have been sent in early, and were too long to be gotten before the members of the congress in any other way. Of course, the final transactions of the Congress will contain in addition to these papers, the discussions they elicit, the formal addresses, some account of the demonstrations given, minutes, lists of officers, committees, etc.

E. J.

Seventh Annual Report, Ophthalmic Section, Department of Public Health, Egypt. By **A. F. MacCallan,** Director of Ophthalmic Hospitals. Quarto, 54 pages, with tables and graphs. Cairo Government Press. 1920.

The form of this book, with its page of 8 by 13 inches, is well suited to printing extended tables, and large graphs which present masses of statistics and general relations of epidemics at a glance; but it is an inconvenient size to place with other books upon library shelves. The greater part of its matter is statistical and printed in these forms, but there are some very interesting facts set forth in the text, in the Historical and Clinical Section.

The importance of gonococcus conjunctivitis in Egypt has elsewhere been alluded to (p. 400). Glaucoma is also a very important disease and cause of blindness in Egypt: 2,715 cases of prim-

ary glaucoma were examined, and 450 trephinings and 299 iridectomies were done for it. The total of glaucoma cases seen in six years amounted to 12,341 among 516,430 patients, 2.39 per cent.; and the majority of these, 1.51 per cent., were cases of absolute glaucoma. Optic atrophy, too, is an important cause of blindness: 136 cases were encountered. Of cataract there were 1498 cases, but so many were complicated by corneal opacities, that only 364 came to extraction. The extraction was with iridectomy, which was preliminary in 10 cases.

The pathologic report includes 242 eyes sectioned, 44 for tumors, of which 29 were malignant. The section on ophthalmic treatment in the schools seems to show that trachoma is becoming less prevalent. Of serious cases treated in their first year of school, the percentage had declined in three years from 45.5 to 32.2; and in 1919-20, the percentages were in the second school year 14.8, in the third 8.5, and in the fourth 7.6. But of school children inspected, an enormous number showed evidences of active or past trachoma; of 2910 in eleven localities, over 90 per cent. The percentage varied from 83.4 to 99.1.

The different publications of this ophthalmic section are of considerable importance. They include: Annual Reports on Ophthalmic Hospitals 7; Bulletins of the Ophthalmological Society of Egypt 13; and 7 occasional papers and monographs. Dr. MacCallan is to be congratulated on the ophthalmic achievements of this section in Egypt, under his administration. The profession needs to be reminded how much helpful information is coming from this source.

E. J.

The Phoroptor, Henry L. de Zeng. Small octavo, 120 pages, 59 illustrations. Published by the author, Camden, N. J., 1922.

This book frankly indicates in its name its relation to the instrument which it describes and brings to the attention of its readers. Beyond this the preface states: "If this book contributes in any degree to a clearer understanding of the importance of testing the ocular muscles and of the possibilities of great good to be accomplished thru the systematic making of such tests, the object of the work will have been attained."

The first three chapters deal with "The Evolution of Eye Testing," "The Motor Muscles," and "The Basis of Muscle Testing." Then follow the descriptions of the instrument as a whole and of the different "units" that it includes; and the methods of their use in testing and exercising the ocular movements. Chapter XX is devoted to "General Definitions of Scientific Terms," and Chapter XXI to "Scientific Data Frequently Used." In the latter are given tables of focal lengths, prism values, prismatic effects of decentration of spherical lenses, the transposition of cylinders, and accommodation at different ages.

The book is very clearly written, without the use of unnecessary words. It is exceptionally free from the introduction of extraneous matter for the purpose of making a larger volume. Except for a few such expressions as "motor muscles," the language is excellent. The absence of an index is a defect, but not so important here as in works of reference. The type is large, the illustrations clear, the printing and paper excellent.

E. J.

CORRESPONDENCE.

The International Congress.

To Our Readers:

It is not possible to give, to those who did not attend it, the best of the Washington International Congress of Ophthalmology—the personal contacts with great workers in our branch of science. But some impressions of those who came to us from abroad, as well as some of the main features of this notable gathering, are worth preserving in this form, as they will not be found in the scientific proceedings which will appear later.

The fire which destroyed the upper story of the New Willard Hotel, Sunday morning, after some of the members had arrived, furnished a vivid

experience for them, altho it was marked by absence of panic or disorder. It involved the finding of new halls for the General Sessions of the Congress, and for the Commercial Exhibit. But before noon on that day, these had been secured and offers of most valuable assistance were received from the Trustees of the Corcoran Art Gallery, and other institutions; so that the smoothness of the arrangements was but little interfered with. The Commercial Exhibit was opened in the Washington Hotel, at the other end of the same block, and most of the meetings were held in the beautiful Continental Hall of the Daughters of the American Revolution, a few minutes' walk from the hotels, across the splendid park south of the White House. Registration was carried on in the Gridiron Room, at the New Willard, where most of the guests remained as tho nothing serious had occurred.

When the meeting assembled at 9:30 Tuesday morning, the Vice-president of the United States was already waiting in the building to extend the official greeting of the National Government to the distinguished foreign guests, who had come in response to the invitation sent out nearly two years ago thru the Diplomatic Service of the State Department. Next day President Harding received the members of the Congress at the White House, with the smile and hand grasp for which he will be long and widely remembered.

Tuesday afternoon was given to the visit to Mt. Vernon. That day, and thruout the week, the weather was of the kind that makes Washington a most delightful place to visit at this time of the year. Tuesday evening the reception, given to the members of the Congress by the Directors of the Corcoran Art Gallery, gave ample opportunity for those who had know each other only by name to become better acquainted. The background of the beautiful building, with its great collection of paintings, and the atmosphere of music and good feeling, furnished most favorable conditions for the social enjoyment of the occasion. The wives of Prof. Barraquer of Barcelona, Dr. Otto Roelofs of Amsterdam, Prof. Whitnall, and Dr. Tooke of Montreal, and the wives and daughters of many of the American members added to the spirit and interest of the occasion.

Shortly after the opening of the Congress the nominating committee presented the list of officers for the Congress; which was supplemented at later sessions, as representatives of other countries presented their credentials. The officers chosen were as follows:

President

Dr. G. E. de Schweinitz, of Philadelphia, Pa.

Vice-Presidents

Dr. T. M. Li, of China.
Dr. C. E. Finlay, of Cuba.
Dr. Francisco J. Soriana, of Argentine.
Dr. Caesario de Andrade, of Brazil.
Prof. Emile Gallemaerts, of Belgium.
Dr. Pimental Franco, of Brazil.
Prof. F. de Lapersonne, of France.
E. Treacher Collins, F. R. C. S., of England.
Prof. H. S. Rochat, of Holland.
Dr. Aurelia Beruan, of Peru.
Dr. George Mackay, of Scotland.
Dr. D. Francisco Poyales, of Spain.
Prof. I. Barraquer, of Spain.
Dr. William Z. Hons, of Czecho-Slovakia.
Prof. Alvar Gullstrand, of Sweden.
Dr. Santos Dominici, of Venezuela.
Dr. Salvatore Floria, of Italy.
Dr. Lucian Howe, of Buffalo, N. Y.
Dr. Edward Jackson, of Denver, Colorado.

Secretary-Treasurer

Dr. Luther C. Peter, of Philadelphia, Pa.

Secretaries

Dr. Albert Lasalle, Montreal, Canada, *French-English.*
Dr. Francisco M. Fernandez, Havana, Cuba, *Spanish-English.*
Dr. Jesus M. Penichet, Havana, Cuba, *French-Spanish.*

The total number who joined the Congress is about 1100. Of these 600 registered at Washington; and the members of their families and visitors swelled the total to between 800 and

900 in attendance. Of these 25 members came from Canada, five each from Cuba and Great Britain, France and Spain each three, Mexico, Holland and Sweden each two, and seven other nations one each; making 54 foreign members and 17 different nations represented at the Congress. From three other countries came papers, whose authors could not be present.

The difficulties of language were not so great as might have been anticipated. Many visitors, like Dr. Li of China, and Prof. Finlay of Cuba spoke excellent English. Prof. Barraquer and Prof. Poyales, altho speaking mostly in Spanish, spoke also in faultless French. Prof. de Lapersonne, always using French, spoke so slowly and distinctly that those who had a very imperfect comprehension of the language could still follow his remarks. His colleagues spoke English, as did all the members from Sweden, Holland and Belgium. Listening to an unfamiliar language is not so bad as straining to catch the words of a speaker who does not speak loud enough; for there are many words relating to ophthalmology that are common to most of these languages, and the abstract in the program, printed in each official language, helped each hearer to follow the presentation of any paper. Then there is expression by gesture, in which the Latin races excel, and in which Prof. Barraquer is an adept. By that means alone one could almost follow the steps of his operation, as he described it. Important announcements were repeated by the French and Spanish secretaries, who also translated the substance of remarks in discussion for those authors who could not glean for themselves the points made by various speakers, who discussed their papers.

The foreign members, who made comparisons with other congresses of ophthalmology, were all favorable to this for the excellence of the arrangements and the high scientific value of the discussions. Each session completed the program arranged for it, yet found therein enough to fill the time allotted. There were numerous flashes of humor that brought spontaneous laughter; but the clash of ideas, altho very distinct, never developed feeling that caused an awkward or unpleasant situation. Col. Elliot, speaking of the Barraquer operation, warned young men to stick to more familiar and less difficult methods. He stated if he had a cataract he would have it extracted with capsulotomy, after preliminary iridectomy, and followed by secondary operation if need be. After this it was startling to hear Prof. Barraquer say in French, "As I could not operate on myself, so would I." This discussion also brought out the immediate results of Prof. Barraquer's operations, in the last two weeks, at Boston, New York, Philadelphia, and Richmond. After some less favorable cases in the places first named, he had done at the last two cities 23 consecutive intracapsular extractions with loss of but a drop of vitreous in one case, and good vision restored in all.

The different demonstrations, given mostly at the Army Medical Museum, excited great interest. The "point-o-lite" demonstration of Prof. Gullstrand opened a new era in the use of focal illumination. Sir William Lister's lantern slides shown by Mr. Collins, brought out essential points in the structure of the vitreous. The lantern slides of Magitot, obtained from stained sections by the Lumiere process, under strong illumination gave beautiful pictures. Nordenson's demonstrations of fundus photography are the first in America. Balbuena's modification of the method of silver staining sections of nerve tissue has given some of the finest microscopic slides of the retina, optic radiations and other parts of the central nervous system ever placed under the microscope. The exhibit of Verhoeff could not be duplicated anywhere in the world. Prof. Guyer's rabbits showed the latest results in the study of the heredity of eye defects. The collection of books in the Library of the Surgeon General's Office gave the opportunity of a lifetime to see the most famous of the old books on ophthalmology. Full descriptions of various exhibits could do little more than tell those who did not see these demonstrations how much they missed.

Propositions looking to formal action on the part of the Congress were referred, without discussion, to a committee; which later reported that it was impossible at this time to give adequate consideration to the suggestions offered, so as to arrive at conclusions that could be recommended to the Congress for adoption; and advised that the various subcommittees appointed to consider them be authorized to add to their number and report to the ophthalmic journals and to a subsequent Congress of Ophthalmology. The committees named were as follows:

Letters and characters for visual tests

Dr. Edward Jackson, Denver, Colo.

Dr. A. E. Ewing, St. Louis, Mo.

Dr. G. F. Rochat, Groningen, Holland.

Standards for field taking

Dr. Robert H. Elliot, London, England.

Dr. Luther C. Peter, Philadelphia, Pa.

Dr. L. Magitot, Paris, France.

Prof. C. E. Ferree, Bryn Mawr, Pa.

Anatomic versus ophthalmic nomenclature

Dr. M. Uribe Troncoso, New York City.

Dr. M. Feingold, New Orleans, La.

Dr. J. W. Nordenson, Stockholm, Sweden.

At the business session on Friday, Mr. E. Treacher Collins, on behalf of the Council of the Ophthalmological Society of the United Kingdom, and the societies affiliated with it, extended an invitation to *an Ophthalmological Congress to be held in London in 1925*. Prof. Gallemaerts presented an invitation for the holding of an International Congress of Ophthalmology in Brussels. The thanks of the Congress were tendered for the latter invitation; but it was not accepted, altho as the president pointed out the disposition of the Congress was to give Belgium anything she asked for. Prof. Gullstrand, pointing out his own strictly neutral position during the Great War, moved the acceptance of the invitation extended thru Mr. Collins, with expression of the wish that German should be one of the official languages at that Congress. Prof. Lucien Howe supported this motion; and demonstrated by speaking in German that it was in no way "boycotted" at the Washington Congress. Altho some of the members present refrained from voting on it, the motion to accept the invitation to London in 1925, with the suggestion that German should be one of the official languages, was adopted without a dissenting vote.

The dinner, given by the American members of the Congress to those from other countries, took place at the New Willard, Friday at 8:00 p. m. The president of the Congress, acting as toastmaster, called in brief, appropriate sentences upon the following, who spoke in response for the countries and organizations they respectively represented, in such brief and pointed remarks that in spite of the number of speakers, the meeting was neither unduly protracted nor wearisome.

Prof. F. de Lapersonne for France, Mr. E. Treacher Collins for England, Dr. Carlos E. Finlay for Cuba, Dr. T. M. Li for China, Dr. H. S. Rochat for Holland, Prof. Alvar Gullstrand for Sweden, Prof. E. Gallemaerts for Belgium, Dr. George Mackay for Scotland, Dr. Salvatore Floria for Italy, Dr. D. Francisco Poyales for Spain, Dr. William L. Hons for Czecho-Slovakia, Dr. Walter R. Parker for the United States of America. Prof. Igancio Barraquer of the University of Barcelona, Surgeons General M. W. Ireland for the U. S. Army, E. R. Stitt for the U. S. Navy and H. S. Cummings for the U. S. Public Health Service, and Dr. W. H. Wilmer for the Committee of Arrangements were also called upon and spoke. The meeting concluded with most hearty expressions of mutual respect and good feeling.

It has been demonstrated that the ophthalmologists of the world can hold a very successful congress, even in the face of some disaffection and active opposition. There is every reason to hope that three years hence these unfavorable influences will have ceased their activity, and that the London Congress will be an even greater success. E. J.

ABSTRACTS

Baldino, S. Relation Between Visual Acuity and Size of Globe. Arch. di Ottal. v. 27, 1920, p. 212-220.

All oculists see eyes showing no pathology which are emmetropic, or with equal degrees of refractive error, and still showing a great difference in visual acuity. The author takes up the question whether differences in the size of the globe may account for this. The size of the retinal image varies proportionately as the length of the eye. In every eye, this would cover an equal number of retinal elements and the visual acuity would be the same. The other factor which would affect visual acuity is clearness. The author apparently approves that conjugate foci of the retina are not proportionate to the length of the eye when viewing the same object at different distances. Hence, tho the retinal images cover an equal number of rods and cones, their diffusion circles do not, so that clearness of the image will vary with eyes of different lengths.

A deduction from this is that the present system of recording vision is purely empiric and a certain distance for recording vision should be established for different cases, proportioned to the size of the globe.

S. R. G.

Rasmussen, Christian. End Results of Strabismus Operations. Transactions Dansk Oftalmologisk Selskab. p. 1, 1922.

Out of 271 patients operated on for squint at the Eye Clinic of the Copenhagen Kommunehospitalet, from 1905 to 1920, the author has examined 101 patients and determined the final results. During this period the Eye Clinic has had the same chief and has been following a uniform technic. The basic idea in the technic has been to cause the least possible trauma to the conjunctiva and other structures.

Advancement has been done in the following manner: Prince's forceps is used in holding the tendon. The suture for advancement is armed with three needles, one in the middle of the thread; this needle is brought thru the tendon and conjunctiva from behind. The two ends are passed under the conjunctiva and brought out at the edge of the cornea in the central vertical line, one below and the other above the cornea. The two sutures are tied simultaneously with the eye turned toward the muscle to be advanced. The conjunctiva now lies in a fold at the edge of the cornea. After advancement with tenotomy both eyes are bandaged for 5 days, then one eye. The suture is removed in 10 days, and the patient kept in bed until the suture is removed.

Of the 101 patients reported, 54 had been operated with single tenotomy, 14 with double tenotomy, 1 with advancement alone, 23 with advancement and tenotomy, and 9 with multiple operations. Of 68 cases of convergent strabismus operated with single or double tenotomy, 5 showed improvement but still a remaining convergence of 10° or over, 56 below 10° or none, and 7 secondary divergence. Of 23 convergent strabismus cases operated with tenotomy and advancement and with multiple operations, 3 showed a remaining convergence of 10° or over; 13 below 10° or none, and 4 secondary divergence. Of cases which still showed a convergence immediately after operation, 38 to 40% presented improvement at the time of examination, while the cases of divergence had become more divergent. Of 12 cases of divergence operated, 5 were successful, 6 showed 10° or less and one presented secondary convergence.

Thacker Neville, W. S. Trachoma at Mukden. China Medical Journal, 1921, v. 35, p. 128.

With an experience similar to other ophthalmologists in China, Neville finds that the chief disease of his eye clinic is trachoma. 1023, or 45% of his 2287 patients had this disease, and 74% of these had the following complications: corneal ulcer 186, pannus 183, corneal scars 109, corneal infiltration 154, entropion or trichiasis 117, atrophy of conjunctiva 3, hypertrophy of car-

uncle 2, and massive conjunctival hypertrophy 1.

He prefers Heisrath's operation for excision of the tarsus for cases of entropion with a thick tarsus to other surgical procedures. For symblepharon he failed until adopting Hay's operation as done for contracted socket. For ulcers of the cornea he uses, instead of hot fomenations, Japanese snuff warmers, which the patient applies three times a day himself.

H. J. H.

Depas. Amaurosis Provoked by Lightning. La Clinique Ophthalmologique, p. 63.

The author calls attention to the voluminous contribution to this subject by Van Lint which was read before the Ophthalmic Society of Belgium in 1909. He adds a case report: A young woman of twenty years, while standing in front of a window immediately after lightning occurred, could see only enough to get to a chair. The sign of great importance was the terrific blepharospasm which was increased when exposed to the light. It necessitated the use of a bandage over the eyes for a few days. On the second day there was a hyperemia of the conjunctiva and some conjunctivitis for a few days demanding the use of zinc drops. The pupils were contracted. The fundi were normal.

He considers the case from the hysteric standpoint to the conclusion that in his case hysteria does not account for the condition.

T. J. Dimitry.

Wick, W. Bilateral Phlegmon of the Orbit and Septic Thrombosis of Cavernous Sinus. Klin. M. f. Augenh. v. 65, p. 335.

A man, aged 28, noticed a small red painful swelling of the skin of the right lower lid without known cause. On the following night intense pain, headache, nausea, with swelling of the conjunctiva and exophthalmos. At his admission into the hospital these symptoms were increased. Several conjunctival vessels were thrombosed, perfect immobility of the swollen lids and the exophthalmic globe. The palpebral fissure could not be closed. Cornea slightly opaque, pupil medium sized without reaction. Ophthalmoscopically intense congestion, fundus greyish red, disc not discernible except from the course of the vessels. Arteries narrow, veins tortuous and expanded, ensheathed by grey bands, some hemorrhages. No perception of light. The left eye also showed edema of the lids and conjunctiva, and exophthalmos, media clear, veins enlarged and tortuous. Rhinologic examination negative.

Diagnosis: Bilateral septic thrombosis of the cavernous sinus. Treatment, incision at the right upper and lower orbital margins, and detachment of the periorbit to the optic foramen. After transient improvement there occurred increased disturbances of consciousness, so that the whole right orbit was exenterated the next morning. No hemorrhages. Increase of the left exophthalmos. Loss of consciousness, and death occurred 78 hours after the beginning of the disease.

The orbital tissue and muscles contained numerous extensive foci of round cell infiltration around the veins. At some places the walls of the veins were perforated and the thrombotic masses spread into the surrounding tissue; in some abscesses and numerous staphylococci. The whole optic nerve showed dense infiltration with round cells. The propagation of the thrombophlebitis to the cavernous sinus was easily demonstrable. The transmission from one orbit to the other does not always take place thru the cavernous sinus, but may occur thru transverse anastomosis between the frontal and ethmoidal veins. Lungs and kidneys presented numerous embolic abscesses.

C. Z.

Meesmann, A. Pigmentation of the Corneal Limbus in Addison's Disease. Klin. M. f. Augenh. v. 65, p. 316.

Meesmann described 2 cases. The first in a man aged 31, affected with Addison's disease, altho the blood pressure was not diminished, showed marked brown color of the eyelids and

surroundings, yellowish brown ocular conjunctiva in the interpalpebral zone, according to its exposure to light. The corneal limbus of both eyes was of brownish black color 2 mm. in width, extending over the cornea. This ring consisted, as shown under the corneal microscope and slit lamp, of distinct dots arranged in single complexes, which M. thinks corresponded to single epithelial cells. The surface of the epithelium appeared intact, the pigment occupying the deeper strata. Towards the periphery a system of radial cylindrical canals of lymphatic vessels was visible. Their walls were sharply defined by a dense streak of pigment of fine granulation. Toward the cornea a more narrow ramified and anastomosing system of canals could be followed up as far as the inner border of the pigment ring.

The pigment could not be of uveal origin because there were no disseminations of pigment in the stroma of the iris, and the transits of the blood vessels thru the sclera were free from pigment. Above all, the further course showed a partial disappearance of the pigment analogous to the decrease of general pigmentation. The behavior of the lymphocytes corresponded to the anatomically proven absorption or destruction of the pigment in the skin. The author concludes that the abnormal pigmentation in the eye, in lacking function of the suprarenal glands and probably also in some other general affection which lead to hyperpigmentation of the skin and mucous membrane, is limited to ectodermal structures (epithelium of cornea and conjunctiva). The examination with the slit lamp speaks for the origin of the pigment in the epithelial cells in these cases. In the condition of the lymphatics, a still florid process is recognized and thus a differential diagnostic symptom is given for the distinction from other congenital or acquired but little variable, pigmentation. C. Z.

Asmus, E. Tattooing of Clear Cornea. Kiln. M. f. Augenh. v. 66, 1921, p. 121.

Asmus employed with very good results in 2 cases of clear cornea and in one with partial opacity, the tattooing method of Hesse to cover a disfiguring complicated cataract. A flap of the cornea, marked with von Hippel's trephine, is dissected and the India ink placed under it.

C. Z.

Kooy, J. M. Virus of Febrile Herpes. Klin. M. f. Augenh. v. 66, 1921, p. 75.

Kooy confirmed the experiments of Loewenstein of transmission of the virus of febrile herpes. He inoculated the cornea of rabbits with herpes, material of herpetic, dendritic keratitis, herpes labialis in febrile diseases and one after milk injection. The cultures, morphology, and staining are described in detail. In 22 out of 25 inoculations of herpes material of different origins, a polymorphous microorganism was obtained in the culture and classed under mycobacteriaceae. Three times a culture was grown directly from herpes labialis. In generally affected animals, the microorganism could be isolated 3 times from the blood and spleen, and the splenic pulp yielded positive inoculations. Generally several forms were encountered in the cultures, now and then a clear culture of one, which by cultivation could be converted into other forms. In smears of conjunctival secretions and corneal infiltrations, the various forms could be seen. The microorganism grows well at 37°, better aerobic than anaerobic. It is mainly gram negative. The culture, as well as the original material, could be passed from the cornea of one rabbit to that of others. The virulence was long preserved and was active after 10 weeks. C. Z.

Niederegger, E. Rare Congenital Anomalies of the Iris; Slit Pupils and Corectopia. Klin. M. f. Augenh. v. 64, p. 811.

Niederegger describes a congenital ectopia of the slit shaped pupil of the right eye of a man, aged 31, and an ectopia of the left pupil, the slit shape of which ordinarily was slight, but became pronounced upon strong illumination. So far only 14 cases of slit shaped pupils have been published,

which showed a frequent concurrence with corectopia.

From the anatomic and clinical investigations of ectopia of the pupil two groups are distinguished: 1, Unequal growth of the iris without demonstrable mechanical impediment; 2, Abnormal formation of strands. This was the case in N's. patient. The peculiar, tense, fibrillar tissue in the right pupillary area showed a great resemblance to the degenerated pupillary membrane and its processes, coursing in the shape of bands to the sinus of the anterior chamber, observed by others, which became still greater; as also in this case a tough strand in connection with the pupillary membrane was traceable from the lateral pupillary margin into the adjoining sinus. Thus it seemed probable that the extension of the iris in the surface at two opposite places was prevented by the traction of abnormal strands, and the slit shaped pupil resulted.

The lateral glassy ridge at the sinus of the left eye supported this view as it might have been regarded as the only remnant of such abnormal strand formation. But as it occurred only on one side it caused only a corectopia in the direction of the strand without slit form. The transillumination in this case showed definitely that it depends in the first place on the pigment content of the pigment layer of the iris, while the stroma plays only a subordinate or no part. C. Z.

Pillat, A. Parenteral Injections of Milk in Gonoblennorrhea. Zeit. f. Augenh. 1921, v. 45, p. 269.

In order to gain an objective judgment on the value of exclusive treatment by parenteral milk injections, of gonoblennorrhea of the human eye, Pillat tested the gonococcus contents of the epithelium every 6 hours. There was no other treatment, excepting irrigations with weak solutions of permanganat of potash or physiologic salt solutions for removal of pus, and atropin.

The results in 19 cases are given in tabular form. After the first 2 injections the gonococci generally disappear entirely from the ocular conjunctiva, on the 3d or 4th day, with subsidence of chemosis and redness. On the palpebral conjunctiva and retrotarsal folds, the number of gonococci is very much reduced, but one seems only rarely to succeed in wholly removing the gonococci. They seem to continue to live, and only by a third and fourth injection can they be removed entirely. If 4 injections have not been successful, further injections mostly are without avail. The milk injections do not prevent an infection of the second eye, which shows that they have no permanent effect, and do not produce any immunity, even of local nature.

The author emphasizes that he does not in the least urge an exclusive milk treatment, but, since it has been proven that milk alone is able to cure gonoblennorrhea of the eye, the additional application of milk injections in the treatment of gonoblennorrhea are not only justified, but required in all those cases, in which general chechexia and severe constitutional anomalies, or progressive ulcers of the cornea, do not furnish a contraindication. There is no better or more rapid means of removing the tense swelling of the lids than milk injection; so that they prepare the soil for the classical treatment with nitrat of silver. Finally the author presents his views on the action of parenterally introduced proteins.

C. Z.

Heine, L. Endogenous Uveitis. Graefe's Arch. f. Ophthal, 105 Band, Festschrift f. E. Fuchs.

In the lengthy paper, Heine refers to E. Fuchs' contribution on chronic endogenous uveitis. Heine prefers to call the affection endophthalmitis, because in some cases the uvea and retina are primarily acutely affected. A minute description of the objective and subjective symptoms and the disturbances of function are enumerated, and the casual factors entered into; coming to the conclusion that uveitis or endophthalmitis, especially the chronic form, is not caused by intoxication or by postinfectious intoxication, but thru a genuine infection.

H. A.

Kümmell, R. Genesis of Detachment of the Retina. Klin. M. f. Augenh. 1921, v. 67, p. 150.

According to Kümmell, a number of contradictions render the explanation by Leber of the genesis of detachment of the retina doubtful. Since the employment of the tonometer, almost all cases of detachment, even very recent ones, show hypotension, while Leber and Schweigger emphasized the normal tension at the beginning. The occurrence of ruptures is, according to Kümmell, not regular or frequent. He calls attention to the difference of the postretinal fluid from the vitreous, by its high content of albumin and its greater specific gravity which makes it sink downward. This would not take place if it were the same as the preretinal fluid,

Kümmell sees the explanation in the changes of the whole uvea, infiltrations and degenerations. As vitreous and lens are in their nutrition dependent upon the uvea, the production of fluid for the vitreous will suffer and a decrease of tension in the vitreous space will follow, with certain degenerations of the vitreous. As the vitreous is intimately connected with the anterior portion of the retina, this will follow its retraction. As the pressure in the choroidal vessels is greater than the intraocular tension, a transudation from these will occur, loosening the connection between retina and choroid. Thus detachment occurs by traction from within and pressure from without.

That the pressure behind the retina is greater is shown by the inward turns of the edges of the retinal ruptures. This pressure may be increased by stooping and physical exertion, which explains the occurrence of detachment after them, in eyes with the existing predisposition. The complications of detachment of the retina are only a further development of the original affection of the uvea, as iridocyclitis, cataract.

The impossibility of the genesis of detachment by preretinal strands is proven by the occurrence of reattachment, as always in the upper portion, which the retraction of the strands would necessarily prevent. Hence the therapeutic cutting of such strands is uncertain and of no avail. The treatment must aim to withdraw the subretinal fluid and increase the intraocular pressure, as devised by Birch-Hirschfeld.

C. Z.

Doyne, P. G. Scotomata of Tobacco Amblyopia. Brit. Jour. Ophth. 1922, v. 6, p. 1.

Doyne observes that, since small changes in the acuity of the central retinal zone form so important a factor in the early diagnosis of glaucoma, it is important that more exact knowledge of the various scotomata associated with the different diseases affecting the central retinal zone should be determined.

In studies of tobacco amblyopia, the author places most importance upon the results obtained by the use of a white test object. When using colored test objects, difficulty is met in trying to make the patient adopt a standard saturation. Red is easier to work with than green. Green test objects proved unsatisfactory. While he uses Bishop Harman's scotometer, he feels that Bjerrum's Screen is the method of real accuracy. A 2 mm. test object is used, but for colors a 4 mm. object is used, outside the 10 degree circle. In tobacco amblyopia there appear to be three types of scotomata.

(1) A large scotoma involving the blind spot and the area between the blind spot and fixation, which stops just short of the actual fixation point. (2) A scotoma lying close to fixation, within the 5 degree circle, connected by a relative area to the blind spot, which may or may not be prolonged toward fixation. (3) A scotomatous finger pointing from the blind spot towards fixation.

These three forms demonstrate different degrees of severity. Three typical illustrative case histories and eleven charts accompany the contribution. In early glaucoma, the earliest scotomata are found along the ten and fifteen degree circles, or from the upper and lower borders of the blind

spot. In tobacco amblyopia, it is the area between the blind spot and fixation which is first involved. Finally, the author in later cases takes the after images for red, green and blue. Tobacco patients will see a yellow after image of the blue card; but, except in mild cases, will not appreciate the after image of the red or green. They state after red its site looks rather brighter, and after green rather darker than the surrounding area. D. F. H.

Holth, S. Subconjunctival Fistula Scars After Iridencleisis or Limbal Sclerectomies in Chronic Glaucoma. Brit. Jour. Ophth. 1922, v. 6, p. 10.

Holth states that, while we have learned that in glaucomatous eyes which are enucleated as the result of late infection, the infiltration has effaced the usual conditions present in the scar after successful operations, it is more important to study the anatomic conditions of the scars of the successful operations without any later complications. With this object in view he has since 1905 enucleated glaucomatous eyes which have been subjected to successful iridencleisis or sclerectomies. In substantiation of his statement in 1913. that a real fistula thru the limbal sclera is seen several years after successful operations, he reports the microscopic findings with seven illustrations of five cases examined from five months to six years after successful operations. Under each illustration is a very full description. All specimens showed a soft conjunctival cushion near the limbus, some with a thin glassy bubble and some without. The fistulous tracts were lined with pigment epithelium, some ending in a cyst, others in funnel shaped spaces more or less lined with pigment epithelium.

Two of his illustrations will explain the phenomenon discovered by Seidel of the oozing out of the aqueous thru the thin conjunctival bubble. The author believes that this oozing must be due to the denser connective tissue surrounding the bubble forming an obstacle to the subconjunctival passage of the aqueous. While a normal tension is thus obtained, it is undesirable as it affords an easy way to late infection. Therefore, subconjunctival cicatricial tissue should be avoided. In performing different subconjunctival operations, the palpebral fissure should be well opened vertically, thus affording plenty of space for the formation of the conjunctival flap of the subconjunctival tunnel.

D. F. H.

Hepburn, M. L. Experiences From Trephine Operations for Glaucoma. British Jour. of Ophth, v. 6, No. 3, 1922, p. 97.

The author's contribution contains observations of great merit, and should command the attention of all interested in this question. In all perforating wounds of the eye, it is the aim of the surgeon to avoid permanent inclusion of the iris, owing to the danger which we have always been taught. If this is true, the author fails to follow the argument by which it is sought to justify iris inclusion and silk inclusion in trephine operations. While it is a dangerous practice to leave an opening in the eye only separated from the external air by a relatively thin layer of conjunctiva, this applies to all filtering scars, however they are made, and the only question to decide is which is the least dangerous.

In a subject like glaucoma we cannot be too careful in collecting all the available evidence, in order to enable us to decide on the best type of operation. Hepburn's observations are based upon 140 trephine operations, 29 of which were private patients. Along with his successes he has not escaped the complications which others have experienced, such as delayed reformation of the anterior chamber, loss of the disc, loss of vitreous. Late infection is extremely rare at Moorfield's.

The technic the author has learned to adopt is; to dissect an efficient conjunctival flap in its entire thickness down to the sclera, being careful not to buttonhole. Pulling the flap down the cornea, with a secondary cataract knife the superficial layers of the cornea are stripped up. The trephine is slid along the sclera until it comes in contact with the flap. The flap is

drawn upward and backward so as to avoid buttonholing. The anterior part of the scleral disc is cut thru before the posterior, thus forming a hinge posteriorly. The trephine is never removed until the section is complete. Penetration is indicated when the pupil comes towards the hole. The iris is grasped with straight forceps pulling downward and forward detaching it from its root. The disc is then cut off and the conjunctival flap sutured.

Regarding complications, buttonholing the flap should be avoided; if it occurs a new place must be selected. Loss of the disc happened three or four times; upon one occasion it was not recovered, but made no difference in the prognosis. In complete iridectomy, if intentional, the iris must be pulled well out; a buttonhole iridectomy is unwise. A complete iridectomy by mistake happened three or four times. The author feels that in these cases the root of the iris was probably left behind.

Vitreous loss may not influence drainage; no doubt it depends upon whether it is solid or liquid. This occurred three or four times in the series. Delay in reformation of the anterior chamber occurred in about half a dozen cases. This may be due to drainage beneath the conjunctival flap. If formation is delayed too long, there is danger of iris adhesion. The lens comes forward and sometimes becomes opaque. This occurred two or three times. Usually it is difficult to determine if the opacity existed before operation. Detachment of the choroid did not happen very often, altho it may occur without being recognized. It generally becomes replaced.

Late infection. Inflammations within a few weeks may be ascribed to direct infection. Those taking place many years afterwards in the presence of a thick, firmly attached flap with good drainage, the author does not place under this heading.

Results; cases secured early and operated when tension was normal gave the best results. For acute glaucoma, in which tension cannot be reduced, iridectomy is performed. The series records about thirteen failures, all in those where the tension was raised. In acute and secondary glaucoma the results were not good; there is too much congestion around the limbus.

D. F. H.

Holth, S. Sclerectomy in Chronic Glaucoma. Norsk Magazin for Laegevidenskaben, vol. 82 p. 645.

A flap of the conjunctiva is made like that used as preliminary for the Elliot trephining. A lance knife is used in making an incision 3 or 4 mm. long, about 1.5 to 2 mm. back of the limbus. One blade of a specially constructed forceps is inserted into the anterior chamber back of the posterior lip of the incision, and a strip of the sclera, 1 mm. wide and up to 3 mm. long, parallel with the corneal margin, is punched out. The conjunctival flap is then replaced and stitched. The effect in substance is that of a trephining with an elongated scleral opening. The main advantages claimed by the author are that the scleral defect can be secured without using any pressure on the eyeball, and that it (the defect) becomes located as far as possible from the cornea, where the conjunctiva is thick, thereby giving much better protection against late infections.

D. L. T.

Bachstez, E. Acid-fat Lime as Basis of Scintillating Vitreous Bodies. Wierner med. Wochensch., 1921, p. 1044.

Bachstez for several years has observed a picture of scintillating bodies in the vitreous which showed no lustre or refractive surfaces. The opacities appeared as small spherical bodies of a dull white color, which hardly moved when the eyeball was rotated showing the vitreous to be nonliquified. He had occasion to examine two eyes chemically and found that the small bodies were soluble in hydrochloric acid-ether-alcohol, the usual solvent for fatty lime. Treatment with Sudan gave a delicate reddish color, with Nile blue an intense blue. Incineration verified the test.

H. A.

Bergmeister, R. Rare Epibulbar Tuberculosis. Wierner med: Woch., 1921, No. 24, p. 1045.

A clinical and histologic description is given of a case of tuberculosis of the conjunctiva and of the cornea. The cornea was affected partly by continuity from the epithelial process and partly by interruption, probably by the passage of bacilli thru the lymph stream from the subconjunctival focus to the cornea. It was remarkable, that from the subconjunctival and episcleral tuberculous foci, the process entered the interior of the bulbus thru the anterior scleral passages, indeed, contrary to the lymph stream, which generally leads from within outward. The sclera was partly necrosed; thereby the necrotic scleral portion was not in contact with the tubercles contained in the conjunctiva and subconjunctiva, but they were respectively separated near the anterior passage from the episclera by lymphoid tissue. Only the small cellular layer between the sequestrum and the almost normal ciliary muscle had a partly epithelioid and fibroplastic character.

H. A.

Ferrari, G. Lesions of Fundus Oculi in Lethargic Encephalitis. Arch. di. Ottal. v. 27, 1920, pp. 228-243.

The early writers who describe lethargic encephalitis deny the occurrence of fundus lesions in it. Observers of the recent epidemic, however, have begun to notice them. These observations are reviewed, the author reporting nine cases of his own, with careful description of the fundus findings. He divides the lesions found into two classes:

(1) Those depending apparently upon diseases of the optic nerve itself. Five cases were found to fall into this class and showed hyperemia of the disc, blurring of the disc margins, and frank optic neuritis, occasionally slight turbidity of the retina about the disc. Lesions in the retina were never observed. Later some cases showed a pallor of the disc and slight constriction of the arteries. The functional disturbances in this class were usually greatly out of proportion to the ophthalmoscopic findings. Vision was reduced in some cases to 1/10 in both eyes, more usually 1/2 to 1/3, with concentric constriction of fields, dyschromatopsia and occasional central scotoma. Some cases showed no changes in the nerve when vision was reduced very considerably. These were considered cases of retrobulbar neutritis. The author considers that all his cases of this group represent a true peripheral or retrobulbar optic neuritis due to localization of bacteria or toxins in the optic nerves.

(2) This group includes congestive lesions depending on disease elsewhere in the body, and especially on a rise of cerebrospinal pressure. Cases were characterized by choked disc with marked venous stasis. This occurred in three severe cases, all showing increase in cerebrospinal pressure. From autopsy on one of these cases, the author believes that all of them may depend on hydrops ventriculi caused by stopping of the outlets to the ventricles. The prognosis in both types is usually good if the patient does not succumb to his general condition. Only a few showed an amblyopia persisting for some time after recovery.

S. R. G.

Friede, R. Hydroa Vacciniforme of the Eye. Klin M. f. Augenh. 1921, v. 67, p. 26.

Friede reports in detail the clinical history of a man, aged 48, in whom hydroa vacciniforme of the parts of the skin exposed to the light of the sun during the summer months, commenced in early childhood, affecting hands, face, and especially the nose and ears. Not until his 35th year did the eyes become involved, in intimate connection with the skin disease. The primary direct lesions of the eyes were papulous efflorescences on the lids, infiltrations and ulcers of the cornea and necrosis of the sclera.

Suddenly under intense photophobia and lacrimation, a severe diffuse inflammation of the ocular conjunctiva set in with ciliary injection and succulent chemosis. Soon flat, illdefined, congested subconjunctival nodules arose on places exposed to the sunlight. These assumed a bluish red and finally

a yellowish discoloration, indicating necrosis of the sclera. The thinned conjunctiva perforated, so that the necrotic masses were laid bare. After gradual sloughing, deeply punched out holes of the sclera were formed, their base covered with thin cicatricial tissue; so that a slate grey, not bulging, spot of the sclera remained. On the left eye a flat staphyloma developed in the temporal portion, within the palpebral fissure. The corneas showed maculae and there were remnants of a former iritis.

Secondary changes were: exophthalmus from orbital cellulitis, caused by the scleral necrosis and the subsequent inflammatory infiltration in and around Tenon's capsule; atrophy of the optic nerve from the same cause, and symptoms of cicatricial shrinking of the lids. During the regressive period there was intense hematoporphyrinuria. This was of interest, as hydroa vacciniforme is caused by light in consequence of photodynamic sensibilization thru hematoporphyrin.

For prophylaxis, patients suffering from hydroa vacciniforme of the skin ought to wear well fitting coquilles, especially in spring, as then the sunlight is especially rich in ultraviolet rays. For the lids, curcuma tincture, unguent. ichthyol, and zeozon are recommended. An eye affection is most successfully treated by complete exclusion of light.

C. Z.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville Tenn.; Dr. Gaylord C. Hall, Louisville, Ky. Volunteers are needed in other localities.

DEATHS.

Dr. P. Bajardi, Professor of Ophthalmology at Turin, Italy, died in December, 1921.

Dr. Thomas E. Conard, Philadelphia, aged seventy-five, died suddenly, February 12th, from heart disease.

Dr. Theron James Kinnear, Springfield, Illinois, aged forty-five, died February 28th, following an operation for a furuncle.

Dr. S. A. Pennington, Port Arthur, Texas, aged forty-five, died February 16th, following an operation for appendicitis.

Dr. Duboys de la Vigerie, ex-Chef de Clinique of the Clinique Nationale des Quinze-Vingts, General Secretary of the Société Française d'Ophtalmologie, Chevalier of the Legion of Honor, is dead at the age of seventy years.

PERSONALS.

Mr. Sydney Stephenson has been elected an honorary member of the Midland Ophthalmological Society.

Dr. Casey A. Wood, of Chicago, is returning home from British Guiana by way of England to attend the International Congress.

Dr. and Mrs. Melville Black will be in England during June and July, on an automobile tour with some friends.

Mr. Cyril Jacobs has been appointed honorary ophthalmic surgeon to the Victoria Memorial Jewish Hospital, at Manchester, and oculist to the Cheshire Educational Committee.

Dr. Allen J. McLaughlin, U. S. Public Health Service, Washington, has been elected a member of the Board of Councillors of the Eyesight Conservation Council of New York City.

Drs. William E. Gamble, Ephriam K. Findlay, and Richard C. Gamble, announce the formation of partnership for the practice of Ophthalmology and Oto-Laryngology, with offices at 30 North Michigan Avenue, Chicago.

A dinner was given to Dr. George Edmund de Schweinitz, President-elect of the American Medical Association, by the Philadelphia County Medical Society, on Tuesday evening, April 4th, at the Bellevue-Stratford Hotel. About 500 physicians were in attendance.

At the March meeting of the St. Louis Ophthalmic Society, Professor Ernst Fuchs, Vienna, addressed the Society on "The Progress of Ophthalmic Therapeutics from 1870 to the Present Time." At the close of the meeting, Professor Fuchs was elected an honorary member of the Society.

Dr. Russell W. Raynor, U. S. Public Health Service, has been assigned for duty with the Illinois State Department of Health, to make a survey in the southern sections of the state for trachoma. Dr. Raynor has been in charge of the government trachoma hospital in Pikesville, Kentucky.

In the world of ophthalmology, few names are better known than that of John Herbert Parsons. He is one of the founders of the Council of British Ophthalmologists, and a member of numerous Government committees on matters pertaining to the eyes. His well known "Pathology of the Eye" is alone in its class, and his treatise on Color Vision is the most scientific work on the subject in the English language. He has been made a Fellow of the Royal Society, and the recent honor of Knighthood conferred on him is one which will gratify everyone who knows him.

SOCIETIES.

A new Société de Neuro-Oto-Oculistique has been created at Strasbourg with M. Barré, President and M. Duverger, Vice-President.

The Annual Congress of the Ophthalmological Society of the United Kingdom will be held May 11th to 13th in London, when the Edward Nettleship prize will be awarded.

The Charity Eye, Ear and Throat Hospital of Erie County, Buffalo, New York, has recently issued its thirteenth annual report. It has done some good work in this section of the country and the report makes interesting reading.

At the joint meeting of the Chicago Ophthalmological Society and The Institute of Medicine, April 21, Professor E. Fuchs was the guest of honor. A dinner preceded.

At the January meeting of the St. Louis Ophthalmic Society the following officers were elected for the ensuing year: Dr. F. E. Woodruff, president; Dr. W. A. Shoemaker, vice-president; Dr. John Flury, secretary; Dr. Jos. W. Charles, editor.

At the recent annual meeting of the Puget Sound Academy of Ophthalmology and Otolaryngology the following were elected officers for the ensuing year: Dr. Frederick W. Adams, Seattle, president; Dr. Daniel Hughes Bell, Tacoma, first vice-president; Dr. William G. Cameron, Tacoma, second vice-president; and Dr. John Howard Harter, Seattle, secretary-treasurer.

The Section of Ophthalmology of the New York Academy of Medicine gave a very interesting program on the evening of March 20th. The subject was a symposium on the value of the Wassermann test, and was participated in by Dr. Charles G. Darlington, Dr. John D. Fordyce, Dr. Warren Coleman, Dr. Robert E. Pou, Dr. Ellice M. Alger, and Dr. Herbert W. Wootton.

The Baltimore Medical Society and The Section on Ophthalmology held a joint meeting on Wednesday, March 29th. Hofrath Ernst Fuchs presented a paper on "Ocular Manifestations of Internal Secretion." Dr. George E. de Schweinitz opened the ophthalmologic and Dr. Lewellys F. Barker the medical discussions.

MISCELLANEOUS.

The new building of the Harlem Eye and Ear Hospital, New York, was formally opened March 14th.

The A. Bernard Building, Russellville, Arkansas, is being converted into a government hospital for the treatment of trachoma.

A college for the higher education of blind girls has recently been opened in England, in a beautiful suburb about twenty miles from London. The education will be as liberal as in the best public schools for girls, and the physical and mental development afforded will enable blind girls to live full and active lives at home, at school, and in the professions. The fees are moderate, and there are several scholarships for girls of promise.

The following appointments of ophthalmologists to the various hospitals of Paris are noted for the year 1922-1923.

Hôpital de la Pitié

Consultant in Ophthalmology.....Monthus
Alternate (suppleant) .....Drécourt
Externes.....E. Verger, Miss Thizy

Hôpital Saint-Antoine

Consultant in Ophthalmology.Dupuy-Dutemps
Alternate .....Joseph
Externes.....Menard, Marguet

Hôpital Cochin

Consultant in Ophthalmology.....Cantonnet
Alternate .....Fombeure
Externes.....Leseuer-Lerebour, Miss Joltrois

Hôpital Lariboisiere

Ophthalmologist .....Morax
Assistant .....Bollack
Internes.....Dujarier, Lagrange
Externes.....
....Hudelo, Autier, Isnel, Fenal, Depouilly

Hôpital Laennec

Ophthalmologist .....Rochon-Duvigneaud
Interne .....Valière-Vialeix
Externes.Allaire, Talot dit Margival, Paumelle

Hotel-Dieu

Surgeon.....Prof. de Lapersonne
Assistant.....
Chief of Clinic.....Velter
Adjunct Chiefs of Clinic....Cousin, Gautrand
Chefs de Labor.....Monbrun, Hautant
Internes.....Castéran, Miss Ostwalt
Externes.....Parat, Gély, Bertrand,
Chéreau, Chaupis, Corneau, Mrs. Parat

Hôpital des Enfants-Malades

Ophthalmologist .....Poulard
Assistant .....Boussi
Interne .....Veil
Externe..Cayla, Restoux, Barillot, Miss Lacroix

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in heavy-face type. The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

DIAGNOSIS.

Ammann, E. Testing of foveal vision in the glaucomatous and of amblyopes. (1 ill.) Klin. M. f. Augenh., 1922, v. 67, p. 564.

Amsler, M. General and local tonometric ocular reaction. (2 ill.) Rev. Gén. d'Opht., 1921, v. 35, pp. 477-483.

Cohen, M. Mercury tonometer. (6 ill.) Rev. Cubana de Oft., 1921, v. 3, pp. 720-725.

Costello, J. P. Importance of ophthalmoscopic examination in children. Jour. Missouri State Med. Assn., 1922, v. 19, pp. 118-120.

Dameno, E. Hand phorometer, (1 ill.) La Prensa Med. Argentina, 1921, v. 8, p. 343.

French, J. W. Interocular distance. Arch. of Optometry, 1922, v. 1, pp. 51-55.

Schnyder, W. F. Simple arc slit lamp and new principle of illumination. (7 ill.) Zeit. f. Augenh., 1922, v. 26, pp. 328-345.

Sulzer, G. A. Chart for testing vision of literate and illiterate. (Chart). A. J. O., 1922, v. 5, p. 208.

Tallman, M. H. Test chart usable with or without mirror. (1 ill.) Arch. of Optometry, 1922, v. 1, pp. 26-28.

THERAPEUTICS.

Ascher, K. W. Quartz and Kromayer lamp in treatment with ultraviolet light. (2 ill.) Klin. M. f. Augenh., 1922, v. 67, p. 662.

Avalos, E. Indications and contraindications for salvarsan and neosalvarsan in ocular therapeutics. Rev. Cubana de Oft., 1921, v. 3, pp. 695-703.

Chenet, L. Protein therapy in ophthalmology. Médicine, 1922, v. 3, p. 269. Abst. J. A. M. A., 1922, v. 78, p. 849.

Erdoes, E. Subconjunctival salt injections. Zeit. f. Augenh., 1922, v. 46, p. 358.

Fox, L. W. Hydrostatic ocular irrigator. (1 ill.) Rev. Cubana de Oft., 1921, v. 3, p. 729.

Jendralski, F. Radiotherapy for tumors and tuberculosis of eye. Klin. f. Augenh., 1922, v. 67, pp. 629-634.

Monthus, A. Thermal mineral waters in ophthalmology. Médicine, 1922, v. 3, p. 270.

Simon de Guilleuma. J. M. Theory of ions in ophthalmology. (2 ill.) Rev. Cubana de Oft., 1921, v. 3, pp. 666-671.

Terrien, F. Subconjunctival injections. Médicine, 1922, v. 3, p. 251. Abst. J. A. M. A., 1922, v. 78, p. 848.

Toulant. Salves in ophthalmology. Médicine, 1922, v. 3, p. 278. Abst. J. A. M. A., 1922, v. 78, p. 849.

Vacher, L., and Denis, M. Galvanocautery in ophthalmology. Médicine, 1922, v. 3, p. 272.

Repeated titles. **Stumpf.** (A. J. O., 1922, v. 5, p. 162.) International Medical and Surgical Survey, 1922, Feb., p. 88.

OPERATIONS.

Fertig, A. New pressure bandage. Zeit. f. Augenh., 1922, v. 47, p. 100.

Grosz, E. v. Transfixion of iris after Fuchs. Zeit. f. Augenh., 1922, v. 46, p. 357.

Merz-Weigandt. Hair sutures. Klin. M. f. Augenh., 1922, v. 67, p. 649.

Ramsay, A. M. Operating hand lamp. (1 ill.) Arch. of Ophth., 1922, v. 51, p. 152.

PHYSIOLOGIC OPTICS.

Boegehold, H. History of lens cardinal points. Zeit. f. ophth. Opt., 1921, v. 9, pp. 161-170.

Guist, G. Perception of space and space pictures. (10 ill.) Zeit. f. Augenh., 1922, v. 47, pp. 31-41.

Mueller, E. Monocular and binocular stimuli of dark adapted eye. Pflueger's Arch. f. d. g. Phys., 1921, v. 193, p. 29.

Oehrwall, A. Analysis of sense impressions. Skan. Arch. f. Phys., 1921, v. 41, pp. 227-294.

Palacios, F. Physiologic theory of vision. Pediat. España, 1921, v. 10, p. 305.

Strebel, J. Photometric measurements of fatigue. Schweiz. med. Woch., 1921, v. 51, p. 1138. Abst. International Medical and Surgical Survey, 1922, March, p. 168.

Tscherning, M. Adaptation of eye to light. Compt. rend. Soc. de Biol., 1922, v. 86, p. 223. Abst. International Medical and Surgical Survey, 1922, March, p. 162.

Repeated titles. **Passow.** (A. J. O., 1922, v. 5, p. 162.) International Medical and Surgical Survey, 1922, Feb., p. 88.

REFRACTION.

Chambers, T. R. Trifocals minus wafers. (4 ill.) Arch. of Ophth., 1922, v. 51, pp. 154 and 172.

Graves, A. Refraction as a side line. Med. World, 1922, April, p. 136.

Kuehl, A. Vertex spherometer. Zent.-Zeit. f. Opt. u. Mech., 1921, v. 42, pp. 517-519.

McFadden, F. Anomalous accommodation. (1 ill.) Arch. of Optometry, 1922, v. 1, pp. 18-25.

Marquez, M. Variety of principles of biastigmatism. Rev. Cubana de Oft., 1921, v. 3, pp. 649-661.

Mendoza, R. Influence of convex glass on presbyopia. Rev. Cubana de Oft., 1921, v. 3, p. 728.

Repeated titles. **Bloch.** (A. J. O., 1922, v. 5, p. 80.) International Medical and Surgical Survey, 1922, March, p. 164.

OCULAR MOVEMENTS.

Argañaraz, R. Hereditary syphilis with nystagmus. Prensa Med. Argentina, 1921, v. 8, p. 237.

Asmus. Operations on ocular muscles. Zeit. f. Augenh., 1922, v. 47, pp. 79-86.

Blaskovics, L. v. Muscle contraction. Zeit. f. Augenh., 1922, v. 46, p. 359.

Borries, G. V. T. Experimental optic nystagmus. Trans. Dansk. Oto-Laryng. Selskab, 1921, p. 31.

Nystagmus in labyrinthitis serosa. Trans. Dansk. Oto-Laryng. Selskab., 1921, p. 32.

Brown, E. J. One advantage of single vision. A. J. O., 1922, v. 5, pp. 208-210.

Csapody, S. Examination for paralysis of ocular muscles. Budapest Orv. Ujsag., 1921, v. 19, p. 657. Abst. International Medical and Surgical Survey, 1922, Feb., p. 100.

Dodge, R. Latent time of compensatory eye movements. Jour. Exper. Psychol., 1921, v. 4, p. 247. Abst. International Medical and Surgical Survey, 1922, March, p. 167.

Mirror recorder for photographing compensatory movements of closed eyes. Jour. Exper. Psychol., 1921, v. 4, p. 165. Abst. International Medical and Surgical Survey, 1922, Feb., p. 98.

Fischer, J. Movements of eyeballs due to ear. Monat. f. Ohr. u. Lar.-Rhin., 1921, v. 55, p. 764-771.

Fisher, W. B. Development of low visual acuity and ocular dynamics. Arch. of Optometry, 1922, v. 1, pp. 5-13.

Freeman, W. Paralysis of associated lateral movements of eye symptom of intrapontile lesion. Arch. of Neurol. and Psychiat., 1922, v. 7, pp. 454-488.

Friedman, J., and Greenfield, S. D. Traumatic abducens paralysis. Laryngoscope, 1921, v. 38, p. 868.

Fuog, H. L. Significance of exophoria at reading points in presbyopia. Arch. of Optometry, 1922, v. 1, pp. 29-34.

Hotaling, E. E. Treatment of amblyopia in one eye. Arch. of Optometry, 1922, v. 1, pp. 38-41.

Kestenbaum. Hysteric nystagmus. Vienna Ophth. Congress, May, 1921. Zeit. f. Augenh., 1922, v. 47, p. 145.

Landolt, M. Target practice with Hering's double eye. (9 ill.) A. J. O., 1922, v. 5, pp. 189-195.

Lund, R. Peculiar nystagmus phenomena. Trans. Dansk. Oto-Laryng. Selskab., 1921, p. 27.

Mulder, M. E. Orientation illusions in moving train. Nederl. Tijschr. v. Geneesk., 1921, v. 2, p. 2785. Abst. J. A. M. A., 1922, v. 78, p. 932.

O'Connor, R. Transplantation of entire vertical recti for abducens palsy. A. J. O., 1922, v. 5, p. 210.

Rose. Left protuberantial lobe syndome with homolateral partial excitation of sympathetic. Soc. de Neur., Feb., 1922. Abst. Gaz. des Hôp., 1922, v. 95, p. 221.

Rosett, J. Nystagmus in lesion of abducens nucleus. Neurol. Bull., 1921, v. 3, pp. 332-338.

Ryer, E. LeR. Development of visual acuity where both eyes are amblyopic. Arch. of Optometry, 1922, v. 1, pp. 42-45.

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Santos Fernandez, J. Amblyopia of strabismus. Rev. Cubana de Oft., 1921, v. 3, pp. 637-642.

Torres Estrada, A. Sutures in muscular advancement. (5 ill.) Rev. Cubana de Oft., 1921, v. 3, pp. 709-717.

Turner, H. H. Herpes zoster ophthalmicus with ophthalmoplegia totalis. A. J. O., 1922, v. 5, p. 227.

Widowitz. "Doll's eye" symptom of post-diphtheritic paralysis. Münch. med. Woch., v. 68, p. 1674.

Wiseman, E. G. Object of ocular calisthenics. Arch. of Optometry, 1922, v. 1, pp. 14-17.

Woolsey, C. L. Influence of vision on nystagmus. Arch. of Neurol. and Psychiat., 1922, v. 7, p. 526.

CONJUNCTIVA.

Ascher. Keratoplasty. Klin. M. f. Augenh., 1922, v. 67, p. 649.

Bane, W. C., and W. M. Ocular pemphigus. (1 ill.) A. J. O., 1922, v. 5, p. 221.

Bohnslav, S. Amyloid and hyalin degeneration of conjunctiva. Casp. Lek. Cesk., 1921, v. 60, p. 841. International Medical and Surgical Survey, 1922, March, p. 172.

Brand, J. Treatment of trachoma. Zeit. f. Augenh., 1922, v. 47, p. 165.

Cuperus, N. J. Rodent ulcer of conjunctiva. Klin. M. f. Augenh., 1922, v. 67, p. 652.

Elewaut. "Dmégon" in treatment of gonococcal conjunctivitis. Arch. Med. Belges, 1921, v. 74, p. 1046. Abst. International Medical and Surgical Survey, March, 1922, p. 174.

Feigenbaum, A. Tarsectomy for trachoma and trichiasis. Klin. M. f. Augenh., 1922, v. 67, pp. 600-606.

Hammerschmidt, J. Causative agent of Koch-Weeks conjunctivitis. Münch. med. Woch., 1921, v. 68, p. 1246. Abst. International Medical and Surgical Survey, 1922, p. 31.

Krauss, L. Nature and origin of pus cells in gonorrheal conjunctivitis as studied by Arneth's method. Münch. med. Woch. 1922, v. 69, p. 38. International Medical and Surgical Survey, 1922, March, p. 174.

Kreiker, A. Changes in lacrimal gland with trachoma. (dis. 3 ill. bibl.) Zeit. f. Augenh., 1922, v. 46, p. 358; v. 47, pp. 111-121.

Kritzler, H. Diphtheria and diphtheroid bacilli in newborn and their clinical significance. Zeit. f. Geburts. u. Gyn., 1921, v. 84, pp. 179-207.

Liebermann, L. v. Caustic resection of tarsal conjunctiva in trachoma. Zeit. f. Augenh., 1922, v. 47, p. 163.

Liebermann, L. v., and Vermes, L. Plasma cells in hypertrophied conjunctiva in trachoma. Zeit. f. Augenh., 1922, v. 46, p. 361.

Miceli. Provocative recurrent conjunctivitis. Gior. di Oculistica, 1922, v. 3, p. 10. Abst. International Medical and Surgical Survey, 1922, March, p. 173.

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Von Der Heydt, R. Keratosis at limbus. A. J. O., 1922, v. 5, p. 228.

Ulises de la Garza, J. Prophylaxis of purulent ophthalmia. Rev. Cubana de Oft., 1921, v. 3, pp. 688-695.

Repeated titles. **Gernet.** (A. J. O., 1922, v. 5, p. 163.) International Medical and Surgical Survey, 1922, Feb., p. 104. **Winsky.** (A. J. O., 1922, v. 5, p. 163.) Abst. International Medical and Surgical Survey, March, 1922, p. 174.

CORNEA AND SCLERA.

Alaimo. Alterations in cornea from phosphorus. Gior. di Oculist., 1921, p. 21. Abst. Rev. Gén. d'Opht., 1921, v. 35, p. 545.

Arana, J. de. Treatment of serpiginous ulcer of cornea. Rev. Cubana de Oft., 1921, v. 3, pp. 671-677.

Cabannes, C., and Chavannaz, J. Subcutaneous injections of novarsenobenzol in hereditary syphilitic interstitial keratitis. Jour. de Méd. de Bordeaux, 1922, v. 94, p. 10. Abst. International Medical and Surgical Survey, 1922, March, p. 178.

Fietta, P. Treatment of corneal affections with iontophoresis. Rev. Gén. d'Opht., 1922, v. 36, p. 10.

Fleisher, M. S. Heterotransplantation of lens and cornea. Jour. Med. Research, 1921, v. 42, pp. 491-503.

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Kestenbaum. Inflammation of cornea with croup. Vienna Ophth. Congress, June, 1921. Zeit. f. Augenh., 1922, v. 47, p. 146.

Langendorff. Antisyphilitic treatment of parenchymatous keratitis. Deut. med. Woch., 1922, v. 48, pp. 290-292.

Loewenstein. Corneal clouding. Klin. M. f. Augenh., 1922, v. 67, p. 650.

Musiat, A. Pustuliform keratitis profunda. Tygodnik. Lekar., 1921, No. 6. Abst. Rev. Gén. d'Opht., 1922, v. 36, p. 35.

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Schinck, P. Treatment of serpent ulcer with ultraviolet light. (bibl.) Zeit. f. Augenh., 1922, v. 26, pp. 349-355. Abst. International Medical and Surgical Survey, 1922, March, p. 176.

Torres Estrada, A. Neuroparalytic keratitis following rabies in hereditary syphilis. Rev. Cubana de Oft., 1921, v. 3, pp. 704-709.

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Jackson, E. Hemiopic pupil reaction. A. J. O., 1922, v. 5, pp. 233-234.

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A STUDY OF TUMORS OF THE LACRIMAL GLAND WITH REPORT OF A MIXED TUMOR.

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After a historical review of the subject and discussion of the development of the lacrimal gland, the pathology of such tumors is discussed and a classification of them given. A case is then reported with the pathologic conditions found on its removal. Mikulicz's disease is also taken up with reference to its type, etiology and pathology. A full bibliography of the literature is appended.

HISTORICAL REVIEW.

That tumors of the lacrimal gland are rare is shown by the fact that only 229 cases have been reported in a period of 323 years. A most valuable and comprehensive review is that of A. S. Warthin[1], published in 1901; this includes cases reported prior to 1899. After careful search of the available literature he collected 132 cases.* Warthin found the earliest case reported was in 1598. Fabricius Hildanus in *Observationes Chirugicae* speaks of a large lacrimal gland tumor with extension into the conjunctiva of the upper lid. This was successfully treated.

R. A. Greeves[2] compiled a report of 42 cases in 1914, and Birch-Hirschfeld[3] the following year one of 75 cases. Lagrange[4] in *Traite de L'Oeil, II,* gives a report of 58 cases. Upon careful review of all four reports, it was found that 17 each of the cases of Greeves and Birch-Hirschfeld were identical reports, and 2 of Warthin's were found in each of these reports. Lagrange's review, with the exception of five cases, was found in one or more of all three of the above.

Thus after careful review of all the literature and a long search to add new cases and to eliminate doubtful orbital tumor growths, only 112 cases have been found in addition to those compiled by Warthin.

*See footnote page 430

PERIOD COVERED BY THIS STUDY AND ITS PURPOSE.

This study covers the period from the beginning of 1900 to the beginning of 1922, a period of 22 years. In addition to the 132 cases compiled by Warthin, it adds 15 verified tumor cases reported prior to 1900 not included in Warthin's report, and also has verified the reports of all authors with the exception of a very few, where the literature was not accessible.

Numerous writers have declared lacrimal gland tumors to be rarely malign; several eminent authorities have stated that metastases do not occur. This study shows:

(1) Lacrimal gland tumors are malignant; any disease with a death rate of 12 patients among 95, or 12.63 percent, and 19 recurrences cannot be viewed with the idea that it is rarely malignant. This study also shows that 7 patients had definite metastasis and reveals that two well known ophthalmologists of large experience have reported cases where the symptoms definitely pointed to metastases, but autopsy was not obtained and the fact of metastasis could not be verified.

(2) It further substantiates the epithelial origin advanced by Verhoeff,[5] Birch-Hirschfeld and more recent writers, and shows that these tumors are better classified as mixed tumors than adenoma or carcinoma types.

(3) This study separates the Mikulicz syndrome reports in as far as pos-

sible from true neoplasms of the lacrimal gland, and the reasons for so doing are brought out; it further shows that lacrimal gland enlargements occurring in a patient with a Mikulicz syndrome or a leukemic picture should not be classified as a new tumor growth of the lacrimal gland. A comparison of table 1 with Warthin's Authors' Classification Table shows that it follows it quite closely, with the exception of the separation of the Mikulicz reports and the better nomenclature and classification which has come with the more careful pathologic study of recent years.

EMBRYOLOGIC, ANATOMIC, AND HISTOLOGIC DEVELOPMENT OF THE LACRIMAL GLAND.

It is well to bear in mind the embryology, anatomy, histology, and pathology of the lacrimal gland when a patient presents with a growth situated in the lacrimal fossa area of the orbit. Not only is this very necessary if surgical interference must be undertaken, but it is most essential to avoid hasty surgery, when the enlargement is due to causes which surgery cannot relieve, as a leukemic, syphilitic or infectious enlargement. The lacrimal gland begins to develop in the third month of fetal life. It is partly derived from the epiblast and partly from the mesoblast layers. The connective tissue, vessels and follicles spring from the mesoderm, while the alveoli come from the epiblast.

The normal gland is divided into a superior and inferior lobe, the inferior being a small accessory gland. Both parts of the gland are serous and of a tubular structure. The gland contains some twelve ducts which unite, passing into the inferior portion to secrete the tears on the conjunctiva. The gland measures 20-25 mm. transversely, 12 to 15 mm. antero-posteriorly and five or more in thickness.

The lacrimal gland is situated deep within the bony orbit, in the upper and outer part, and is well protected from trauma and infection. This fact probably accounts for the few disorders to which this gland is subject. The salivary and parotid, of identical structure but more exposed, are the sites of frequent pathologic disorders. The normal gland is not closely covered with periosteal tissue, but an inflamed gland may become very adherent and difficult of removal. The gland has no capsule. The adult gland possesses adenoid tissue. The nerve supply is from the fifth, and some fibers are received from the seventh.

The tendinous expansion of the levator palpebrae runs between the superior and inferior lobes of the gland. Care must be taken not to divide this in removal of the gland.

PATHOLOGY.

All the early reports were diagnosed by the clinical characteristics of the growth. Nearly all the known pathologic tumor terms are found in the reports (Table 1.). Warthin was the first to attempt to show the true pathogenesis of lacrimal gland tumors, namely epithelial. This is still in dispute, but the evidence is conclusively growing in favor of the epithelial origin. The reports of Birch-Hirschfeld, Verhoeff and several of the more recent writers confirm the epithelial origin.

Many of the tumors are of the same type as found in tumors of the salivary and parotid glands. Wood,[7] in a study of 54 tumors of the salivary glands, decided these tumors are not endothelial, but epithelial, and that 95 percent of salivary tumors are of the mixed type.

Three divisions of growths of the lacrimal gland may be made; (1) solid tumors or neoplasms, (2) cysts or dacryops, (3) symmetric tumor like enlargements due to Mikulicz syndrome or lymphomata, as these enlargements are often called. Such enlargements are not true tumor growths and may give rise to serious difficulties in diagnosis. The accessory portion of the gland is seldom involved; few reports have been found and these are mostly of cysts.

Table 1.

CLASSIFICATION ACCORDING TO ORIGINAL OBSERVERS.	No. Cases
Adenoma	2
Adenocarcinoma	4

Adenocylindroma	1
Adenosarcoma	2
Angiomyxosarcoma	1
Angiosarcoma	1
Carcinoma	5
Chondroepithelioma	1
Chondrosarcoma	2
Cylindroma	7
Enchondroma	1
Endolymphangioma	1
Endothelioma	10
Epithelioma	4
Fibroadenoma	2
Fibrochondroadenoma	1
Fibromyxosarcoma	1
Granuloma	1
Hemangioma	1
Hypertrophy	5
Lymphangioma	1
Lymphendothelioma	2
Lymphepithelioma	1
Lymphosarcoma	4
Mixed	14
Myxoma	1
Myxoadenoma	1
Myxochondroma	1
Myxosarcoma	1
Nocardiasis	1
Sarcoma	10
Sarcoma, small round cell	6
Sarcoma, spindle cell	4
Syphilitic	1
Teratoma	1
Tuberculosis	6
Unclassified, unable to obtain literature except in Index Medicus	4
Total	112

Division 1. A little less than half the growths reported are of the mixed type of tumor. Christopherson and Archibald[8] report an interesting case of nocardiasis, an involvement with a fungus organism similar to actinomycosis. Five cases of hypertrophy are noted; nothing in the clinical reports shows any involvement of any of the salivary glands, and the few that were examined microscopically show a simple hypetrophy. These cases therefore cannot be classed with the Mikulicz syndrome reports. Bilateral carcinoma and sarcoma, microscopically verified, have been reported several times. Six times tuberculosis[9] of the lacrimal gland has been reported. In three of the reports, it was shown that tubercle bacilli were found in the tissues; and in the others miliary tubercles, giant cells or caseation were present.

Division 2. Cysts or dacryops are cystoid dilations of one or more of the ducts of the gland and are comparatively rare. Reports of cysts are not included in my tables. Warthin reported but three in his authors' classification. It may be of interest to know that Rogmann[10] collected 24 cases in 1899, and Lagrange and others have added some since, making more than half a hundred cases in addition to the solid tumors.

Malignancy. An effort has been made to classify all cases so as to show the type of tumor, the age, the duration, the eye effected, the predominance of sex if any and the recurrence incidence. A number of reports are incomplete in one or more of these details, and many patients were not followed up after operation or examination; so that the final condition is not known as to the recurrences, and this table therefore gives only partial correct data on the entire series of cases. Recurrence it quite common. Zentmayer[11] reports a tumor known to have existed 18 years, with three recurrences, and the patient still living at 80. In children the tumors are nearly always rapidly fatal.

Table 2.

CLASSIFICATION OF CASES AS TO AGE, SEX, GLAND AFFECTED, DURATION OF GROWTH AND MALIGNANCY.

Total number cases, 112; males, 47; females, 42. Unclassified, 23.

Average age of 88 patients, 39.2 years.

Average duration of tumor in 71 patients, 3 years +.

Gland involved, right 20, left 30; both 8. Not stated, 54.

Recurrence among 95 patients, 19; 20%.

Deaths among 95 patients, 12; 12.63%.

REPORT OF CASE.

History. M. G. Female, age 25. Past three months has noticed a

growth in left outer and upper part of the orbit. Complains of slight tenderness and that the eyeball has a full feeling. Some exophthalmos of left eye is present. Patient has lost twenty pounds during the past year, but thinks this has no connection with present condition. Family history negative, also personal history.

Examination. A large, firm, rounded mass not freely movable is present in the lacrimal gland area. Upon eversion of the lid, (this is done with considerable difficulty), a tumor mass presents slightly. This mass is not movable, feels firm and adherent, as tho attached to the bone. Transillumination of the pupil and globe normal. Fundus shows nothing abnormal. Von Pirquet and Wassermann negative. Blood count normal except slight reduction in hemoglobin. X-ray of the orbit negative for bony growth. Operation was advised at this time but declined. The patient was given iodids and arsenic. Ten months later she returned with the complaint of pain, and that the growth was increasing in size. Vision was reduced to 6/7—.

Operation. Under general anesthesia an incision was made along the outer half of the brow. A hard mass was felt in the lacrimal fossa. It was firmly adherent, and some difficulty was experienced in loosening and bringing it into view. No trace of the lacrimal gland was seen. A tumor 36 mm.x 22 mm. was removed. The wound healed promptly, and three months after the operation the exophthalmos had disappeared. Vision was normal. Up to the present time, now more than five years since the removal of the growth, no recurrence has taken place.

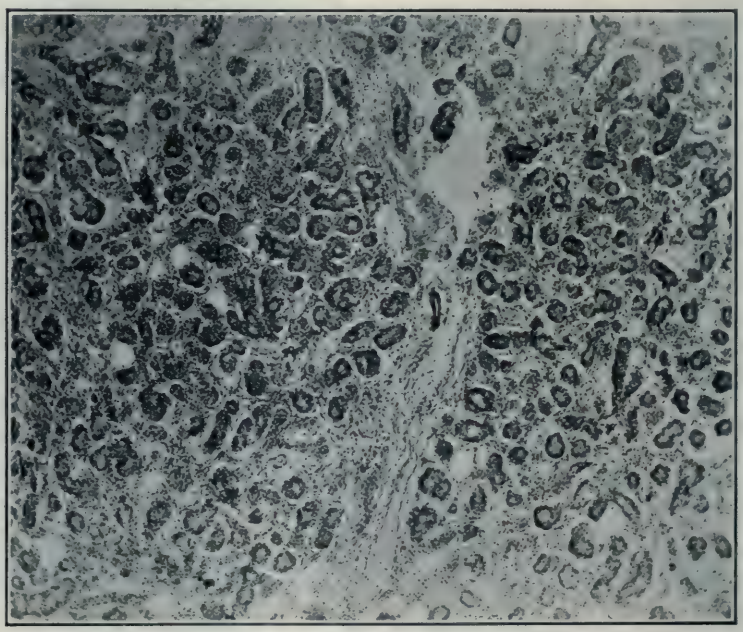

Fig. 1. Photomicrograph of normal human lacrimal gland.

PATHOLOGIC REPORT.

The specimen was submitted to Dr. E. H. Robertson of the University of Minnesota, pathologic department, for study. He made the following report: Sections from this growth show an extremely interesting condition. Masses of undoubted squamous epithelium with cornification are embedded in the tissue. In other areas there is glandular epithelium, the arrangement of which resembles adenofibromata of the breast. In other areas the glandular epithelium is al-

most solid. The stroma is normal connective tissue; other places show hyalin change, still other areas a myxomatous appearance, and in certain other areas it is very cellular, suggesting myxosarcoma. Masses of lymphocytes occur. No cartilage could be identified. The specimen is undoubtedly a mixed tumor of the lacrimal gland.

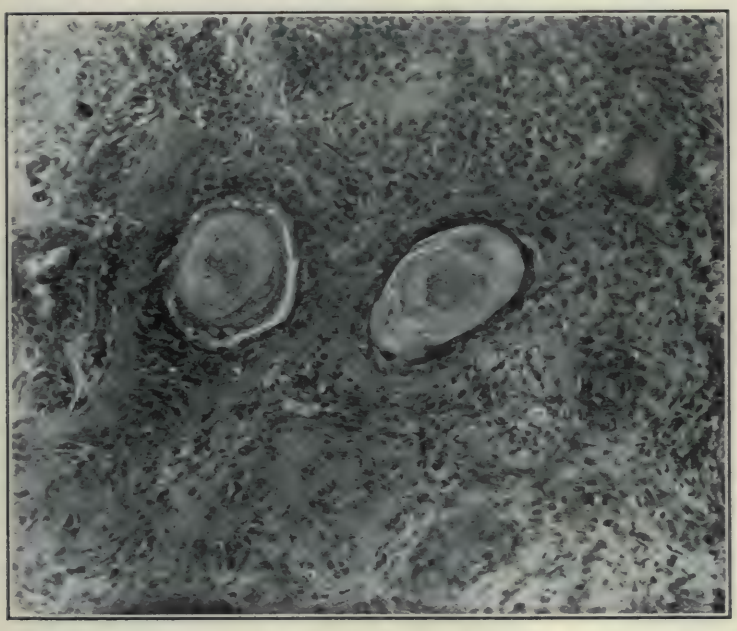

Fig. 2. Photomicrograph from tumor showing squamous epithelium and areas of cornification.

Acknowledgment is made to Dr. F. Robbins of the New York Academy of Medicine for the preparation of the German abstracts and references used in the above.

Division III. *Mikulicz's Disease, Lymphoma, Bilateral Symmetric Enlargement of the Lacrimal Gland.*

Division III is the most protean and interesting of the tumor enlargements of the lacrimal gland. It presents frequent difficulty and confusion in diagnosis. Several reports show that it often begins in one gland, and enlarges slowly for a considerable period of time. The growth is removed and the microscopic examination fails to show a true neoplasm. Within a short time the other lacrimal gland undergoes the same process, and soon the parotids or other of the salivary glands enlarge, and the Mikulicz picture is complete. Reports have shown some cases terminating fatally within two months after the onset, while others have fully recovered without any treatment after a long period of time.

Mikulicz's disease is of interest to the ophthalmologist (1) because of the difficulty in differential diagnosis between it and true tumors, (2) because of the iris and conjunctival complications which are at times associated with a Mikulicz's disease, (3) the dry eye due to loss of function of the lacrimal gland.

It is of interest to the oto-laryngologist (1) because of the peculiar type of deafness described by Samaza[12] and others, and (2) because of the tonsil and other oral pharyngeal hyperplasias with altered mouth secretion, which may accompany a Mikulicz. It is of interest to the internist because of the sudden and fatal changes which the syndrome may undergo.

In 1888 Mikulicz presented before the Verein für wissenchaftliche Heilkunde,[13] Königsberg, a case of bilateral enlargement of the lacrimal and sali-

vary glands. In 1892 he again called attention to what he believed was a distinct disease of unknown etiology. He described it as a disease beginning in the lacrimal glands and extending to the salivary, of slow growth, without any evidence of bacterial findings, non-inflammatory and confined entirely to the glands of the head. The histologic picture was that of a lymphoma.

While many patients present symptoms closely coinciding with Mikulicz's original description, it has been shown by numerous observers that sometimes the parotid or another set of the salivary glands alone are involved, without any lacrimal enlargement. Also, that a peculiar enlargement of the upper eyelids and skin takes place, which gives a drooping appearance so

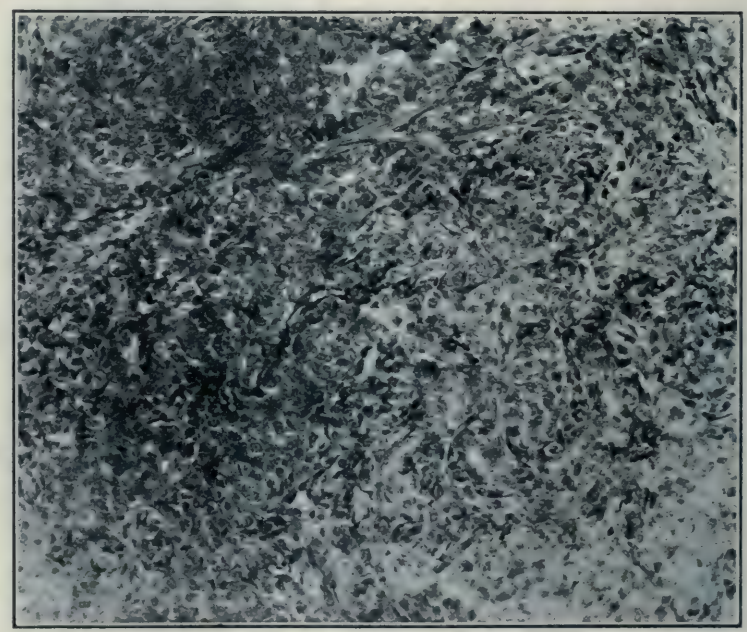

Fig. 3. Glandular epithelium solid. Normal connective tissue stroma.

FREQUENCY OF MIKULICZ DISEASE.

In the period from 1888 to 1922 more than 120 articles have appeared on this subject, 11 of which are found in *Ophthalmic Literature* between July 1920 and July 1921. During the same period, but two articles appeared on lacrimal gland tumors.

In the 34 years since Mikulicz presented this subject, no one has ever found a better term. Review of the literature shows the syndrome was described and recognized before Mikulicz wrote about it.*

*At least 15 cases reported by Warthin come under the head of Mikulicz's disease, and should be deducted from the 132 he reported, leaving but 117 true tumors of the lacrimal gland, in addition to the 15 I have added, reported previous to 1900.

that the patient looks out of a narrow slit on the nasal side. Ziegler[15] gave the appropriate name of "bloodhound eye" to such cases.

Careful reviews of the literature by Howard,[16] Thursfield[17] and others, have brought out the facts (1) that it is not a separate disease but a syndrome, (2) that the etiology is not definitely due to any cause, and (3) that four types of Mikulicz's disease are described in the literature.

TYPES OF MIKULICZ'S DISEASE.

TYPE I. Symmetric enlargement of the lacrimal and one or more pair of the salivary glands. There are no blood changes in this type, nor is there any evidence of lymphatic disturbance. 37 out of 59 cases studied showed no

changes other than the glandular enlargement.

TYPE III. Symmetric enlargement of the same as type I. A reduction in the hemoglobin but blood otherwise normal. Some lymphatic enlargement present. The picture is that of a pseudoleukemia.

TYPE III. Symmetric enlargement of the lacrimals and salivary together with enlargement of all the lymphatics and in addition the spleen and liver. Profound blood changes with great leucocytosis. Rapidly and progressively fatal, a true leukemia. 22 of 59 cases studied were found to belong to types II and III.

TYPE IV. Frenkel[18] declares that 1% of all the socalled enlargements of the lacrimals in Mikulicz's syndrome are physiologic, such as the enlargement due to grief and weeping, menstruation, lactation. Lagrange and others have reported cases which confirm Frenkel's views.

A benign condition with only lacrimal enlargement may pass from type I to type III, and death occur within two months. Some patients present type I symptoms for years; as many as 15 years are recorded, the average being about 7 1/2 years. Recrudescences may occur, and even complete disappearance often occurs during an acute infection, as a pneumonia or erysipelas, prompt enlargement taking place again after the passing of the acute disease. This fact shows that Mikulicz's syndrome is prabably closely related to the true leukemias, as this is a characteristic of the leukemias.

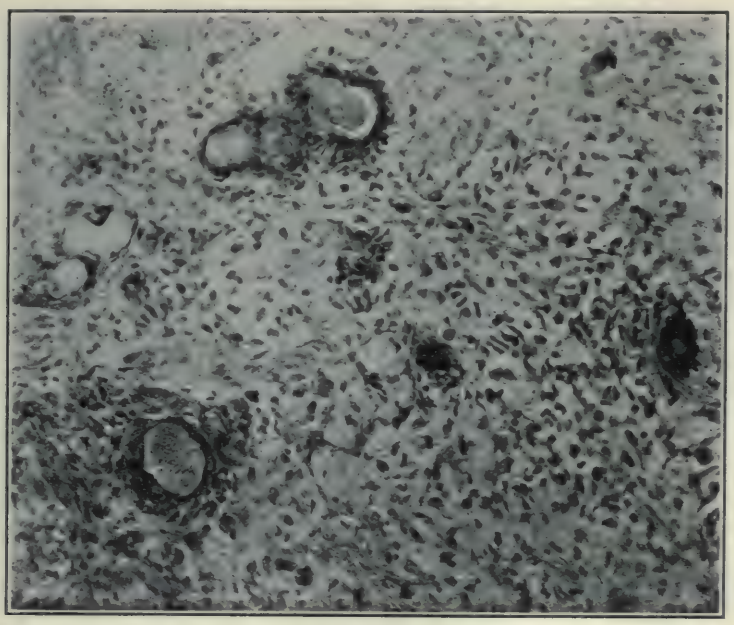

Fig. 4. Photomicrograph of tumor showing myxosarcoma areas, other areas showing hyalin change.

ETIOLOGY.

Many observers have definitely established the fact that a pus infection is a frequent accompaniment and may be a causal factor in some instances, but so far no one has ever demonstrated any bacterial organism in the enlarged glands. Ziegler[15] and Minelli[19] advance a chemotactic action, and the former thinks nasal disease with deficient oxidation a cause. Several others have had patients with an endocrin disturbance. Igersheimer and Pöllöt[20] after review of more than 55 articles to determine if tuberculosis was a cause, came to the conclusion that it rarely if ever is a cause. In Krailscheimer's[21] case tubercle and giant cells were found in the excised tissue of the sali-

vary gland. Napp and Plitt[9] had cases in which the tubercle bacilli were found in the lacrimal gland tissue. After review of these cases, I am inclined to place them under the head of tuberculosis of the lacrimal gland, rather than under a Mikulicz syndrome. Detzel,[22] writing soon after Igersheimer, takes an opposite view, and thinks tuberculosis is a frequent cause. He reviews 43 cases. No one has ever yet isolated the Treponema pallida from the enlarged glands, altho Mikulicz's disease has occurred in syphilitic subjects.

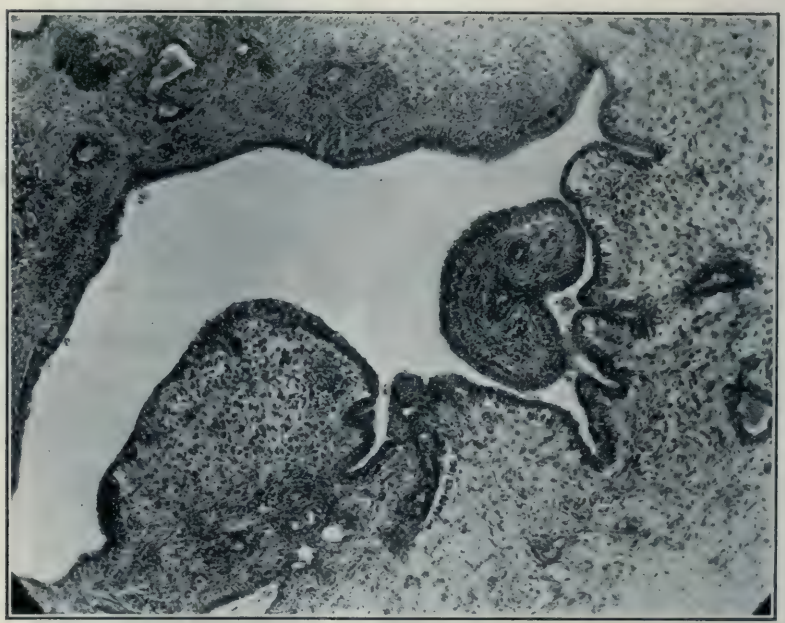

Fig. 5.—Photomicrograph showing areas resembling firboadenoma of breast. Masses of lymphocytes are seen.

PATHOLOGY.

A study of the pathologic reports of the tissue removed shows that these growths are freely movable, and that the disease is confined entirely to the gland. This is not so with true neoplasms, where the inflammation extends to the outside tissue. Histologically, the picture is that of a chronic irritation of the tissue. A hyperleucocytosis of the gland exists, which causes a sclerosis and destruction of the gland tissue and loss of function, hence the dryness of the conjunctiva and mouth so often found in these patients.

These enlargements microscopically differ from a simple hypertrophy in that in the latter there is an overgrowth of individual elements but a retention of the physiologic relationships and functions. That the Mikulicz's disease enlargements closely resemble, and are probably related to the leukemias, is further shown by the fact, that little if any difference exists in the round cell infiltration in a Mikulicz and in that of the most fatal and acute leukemia.

Microscopic findings do not substantiate a new growth structure, in the general acceptance of that term. Well may we agree with Dr. C. Fisher,[22] that the term Mikulicz disease should be used as a term of convenience, until the question of lymphatic hyperplasias are better studied and the question definitely settled.

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AN UNUSUAL CIRCULAR LESION OF THE RETINA.

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OMAHA, NEBRASKA

The lesion here described occurred in a man who gave a history of trauma and had a positive Wassermann reaction. The case is reported from the Department of Ophthalmology, University of Nebraska Medical College. See plate V facing p. 425.

L. V., Colored, Age 34. Present complaint: Three days before coming for examination, while walking out doors, noticed sudden diminution of vision in his left eye. Patient was sure vision had been good in both eyes up to the present time, and stated that two years ago in an army test he had read 20/20, both eyes.

Examination showed: motility normal; convergence fair; pupil reaction to light somewhat questionable. Vision: O.D. 20/20; O.S. 8/200. Ophthalmoscope: O.D. normal; O.S., surrounding the macular region were two shiny bands. The inner one formed almost a complete circle, open only at the outer upper part, and enclosing an area about three times the diameter of the disc. In one place, a vessel crossed it showing slight arching as tho passing over a minute fold. Inside of this was another crescentic line, with a long opening at the upper part, corresponding in size to the halo seen around many normal maculae. The retina within this crescent was hazy and no details were visible. Temporally from the outer band, the retina showed a watered silk appearance. Just up and in from the outer circle were two small red spots, evidently capillary hemorrhages. The fundus was otherwise normal.

Further inquiry into the history showed that the patient had been a boxer and had received many blows on the left eye, but none within the past year. He gave a history of luetic infection, with intermittent treatment,

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W. A. CASSIDY

LEFT EYE OF COLORED LIGHT WEIGHT BOXER. DOES NOT RECALL ANY RECENT BLOW ON EYE. VISION 8 / 200. WASSERMANN 2+. COMPLETE GRAYISH HALO OF MACULA WITH INCOMPLETE HALO FARTHER OUT. SMALL CAPILLARY HEMORRHAGE AT UPPER END OF BOTH OUTER SEGMENTS. RETINA SLIGHTLY WATERED SILK APPEARANCE. RINGS FADED ON TREATMENT BUT VISION DID NOT IMPROVE TO ANY EXTENT.

and his Wassermann test was ++. In the absence of other indications, he was placed on antiluetic treatment.

Examination of the form and color fields showed them to be normal in size and shape, but there was a large relative central scotoma corresponding to the lesion. An absolute scotoma could not be determined, tho there must have been one to account for the low vision.

The fundus picture remained about the same for two days, when it began to fade. The outer crescent became almost invisible except for the temporal part. The inner crescent was still distinct, but the macular reflex appeared faintly. Three days later the rings were almost gone, only the small hemorrhages remaining. At this time, a little deep congestion of the sclera appeared at the outer side. The vision of the eye remained about the same during the time he was under observation.

The patient passed out of observation six days after his first appearance, and efforts to locate him for further examinations have been unsuccessful.

The only description of a similar condition that we can find is in two reports by Frenkel. (Rev. Gén. d'Opht. 1920, v. 34, pp. 1-6). He first called attention to the picture in 1917, (Ann. d'Ocul. Jan. 1917), no similar case having been described previously. The case concerned a soldier who had been subjected to shell concussion (vent du boulet), and showed on examination 1 1/2 years later six distinct circumscribed retinal detachments, all circullar or semicircular. These were unchanged at a second examination four years after the original injury. He had seen no similar reports in the literature since then, but in 1920, met a second case of the same kind. This was a soldier who had suffered several injuries at different times, including shell concussion three years before. Vision left eye was less than 1/100. This eye showed four distinct detachments, the border of each describing part of the arc of a circle, and two being nearly complete; one partly surrounded the disc and one was at the inner border of the macular region. From his plate and description, they appear to have been only slightly raised, with a shiny white line marking their borders. One showed a double border as in our case.

In our case, tho failure of vision was noted suddenly some time after any trauma to the head, it seems probable that one of the many traumata previously received at least prepared the ground for this lesion, as seems to be the case in many late detachments of the ordinary type. The presence of syphilis must be considered, but it hardly seems likely that a localized luetic process could produce this picture. Hence the prognosis given was bad, with no treatment likely to influence it. A most important difference between our case and Frenkel's is the way in which the borders of the lesion in our case had begun to disappear during the few days of observation. This seems to indicate that the detachment, if it can be called a detachment, was very slight, and that some degree of reattachment, or absorption of fluid, had begun to take place, tho the damage to the macula was not repaired, as vision did not improve.

NEW MODEL OF SCHEMATIC EYE FOR SKIASCOPY (RETINOSCOPY) AND OPHTHALMOSCOPY

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The teaching of skiascopy must include the principles on which it is based. These are best understood by actual demonstration of the different movements of light and shadow in the eye, and of the areas and movements visible thru the pupil. The schematic eye here described is designed for such demonstration. It can also be used to practice ophthalmoscopy by the direct and indirect methods.

Skiascopy is practised all over the country in the majority of cases of refraction and has become a necessary step in routine examination; still only a limited number of ophthalmologists thoroly understand and master the optical principles underlying the formation of the light and shadow in the pupil. The knowledge of these principles is of decided importance, however, not only for the student who wants to understand the foundations of the method in order to be able to practise it in a scientific way, but also for the refractionist who desires to improve his knowledge about the formation of the images on the retina, and how they exteriorize themselves to reach the observer's eye.

Much has been written, and many mathematical and optical considerations brought forward in order to explain the physical conditions governing the formation and movements of the light and shadows on the pupil, in different conditions of refraction and with varying methods of examination. Being entirely theoretic, however, they are difficult to understand and remember. On the other hand a practical demonstration that could reproduce in an experimental way the different optical conditions would make the matter easily accessible.

Up to the present time, those wishing to observe the image formed on the retina in skiascopy and detect its changes in different refractive errors, had to depend on a second observer and use either a human eye from which the sclera had been removed in the posterior segment or an albino rabbit's eye, or a schematic eye in which the retina had been replaced by a ground glass. The second observer placed behind the eye watches the size, movements, etc., of the image and correlates them with the movements of the mirror held in front by the first observer at a given distance.

In order to avoid the obvious difficulties and inaccuracies of these methods, I have devised a new Schematic Eye not only useful for the demonstration of the physical law of skiascopy and ophthalmoscopy, but which may be used also as the ordinary schematic eye for training in both methods.

In skiascopy, the following optical facts can be easily demonstrated in a practical manner with this eye:

1. The direct and reverse movement of the shadow in the pupil in emmetropia and ametropia, and the relation of these movements in the pupil to the movements of the illuminated area in the fundus.
2. The cause of the reversal of the shadow in myopia.
3. The size and shape of the illuminated area in the retina, or field of illumination, in different optical and refractive conditions.
4. The field of examination, and the influence of the shape of the pupil on its shape, and on the shadow.
5. The intensity, shape and rate of movement of the shadow in ametropia.

The principal feature of this schematic eye is the large window on top of both cylinders which allows free inspection of the interior. On the retina, below and outward of the papilla, a scale in millimeters permits an accurate measure to be made of the areas of light and shadow. This scale can be illuminated from behind by means of a slot, in order to make it clearly visible.

The shape of the pupil can be changed by means of a slide with apertures of different forms, which can be placed behind the lens

I. The skiascopic shadow can be produced in its simplest form thru a hole in a diaphragm placed one or two inches in front of a screen. By removing the lens from the pupil of the schematic eye and using the plane mirror in the ordinary way, it is easy to observe a crescentic shadow which moves with the mirror at any distance of the diaphragm from the screen. Changing the shape of the pupil with the different apertures on the horizontal slide, the shadow will be seen to assume always the form of the side of the aperture corresponding to the movement of the mirror.

II. When the +20 lens is inserted behind the aperture the refraction comes into play. The shadows are formed in the pupil in the same way, but the direction of its movements changes with the distance of the screen. The conditions on which this change is produced can be studied in the interior of the eye, thru the upper window.

The schematic eye is made hypermetropic or emmetropic and placed at the same level as the observer's eye. Looking thru the plane mirror at one meter distance, a shadow will be seen in the pupil moving directly or with the mirror. Standing up, but keeping the mirror with the same motion at the level of the pupil, and looking directly above or from one side into the eye thru the cut away portion, it would be easy to detect on the retina a small circle of illumination moving with the movement of the mirror.

Pulling out the inner cylinder to make the eye myopic of more than one diopter, and observing thru the aperture of the mirror, the movement of the shadow in the pupil will appear reversed or against the mirror. However, looking inside of the schematic eye, it will be readily ascertained that no change has been produced, the area of illumination continuing to move upon the retina in the same way as in hypermetropia and emmetropia, viz., directly or with the mirror.

III. This apparent contradiction is due to the fact that in myopia the shadow in the pupil, and its movements are seen by the observer as an inverted image, because the rays emerging from the eye are convergent, and have already crossed at a focus at the *punctum remotum* in front of the observer; whereas in emmetropia and hypermetropia the image of the fundus is upright. In ametropia the rays emerging from the eye are parallel; in hypermetropia they are divergent (Fig. 1).

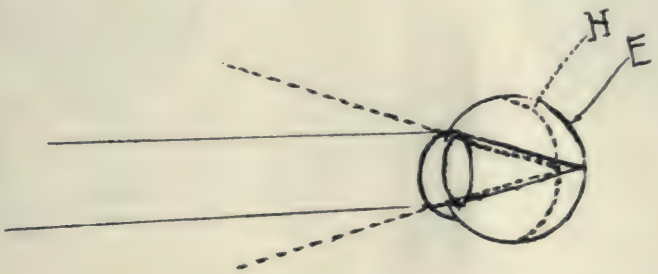

Fig. 1.—Path of the outgoing rays from the patient's illuminated retina in H, E and M. The incoming rays are not represented.

It is necessary to have always in mind that the path of the rays going into the patient's eye from the source of light, is entirely different from the path of the outgoing rays. The former are always divergent when entering the eye in skiascopy and are made to converge by the cornea and lens. (Fig. 2). From the illuminated portion of the retina the rays go out in a different manner according to the refraction, as stated above.

IV. To experimentally demonstrate the path of the outgoing rays, the scale in the retina of the schematic eye is illuminated from behind, by a flashlight or by shifting the lamp; the eye is made hypermetropic, and the observer looking directly at the fundus (the use of the mirror being unnecessary) will readily per-

ceive the image of the scale upright with the small divisions on top of the horizontal line and the figures below. This at any distance from the eye. The same fact holds good for emmetropia. In myopia, the inversion of the image is easy to observe in high grades, 4 or 5 D. for instance. Between the eye and the *punctum remotum* (20 and 25 centimeters) the scale will appear upright. At that point, the point of reversal, there is a zone in which the image is indistinct (neutral point); and further away the scale will be seen inverted with the small divisions below the horizontal line and the figures upside down.

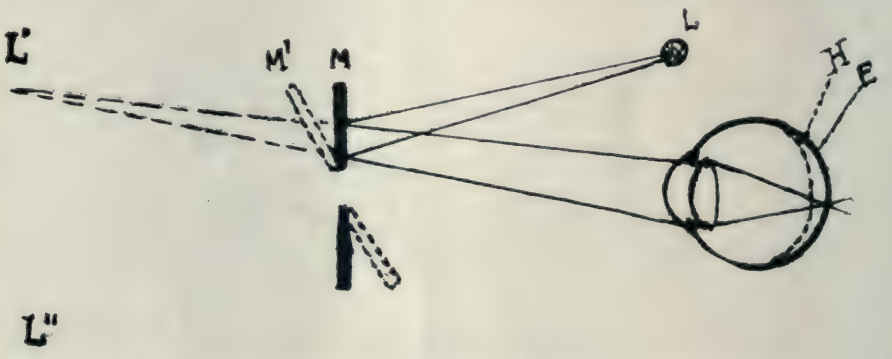

Fig. 2. Path of the incoming rays with the plane mirror. The intersection with the retina in H, E, or M, represents the field of illumination. The emergent rays are not represented.

V. While there is only a displacement of a small area of light upon the retina, there is a crescentic shaped shadow in the pupil formed at one side, due to the shape of the diaphragm. To find the cause of this crescent and its movements, the eye is made again hypermetropic, the lamp is moved from behind to one side, the mirror held in the ordinary way, and the fundus illuminated. The observer moves himself until he is able to see the illuminated scale occupying the center of the pupil, which must be bright in its whole extent without shadows. After ascertaining how many millimeters are covered by the light, the mirror is slightly tilted and immediately a crescentic shadow will be produced, and a part of the scale will become dark. Let us suppose that the diameter of the area of illumination on the whole pupil covered at first 4 millimeters, from 1 to 4, and that on tilting the mirror 1 mm. became dark to the right of the patient leaving the other 3 in the light. The millimeter which became dark, is a part of the field of examination and the shadow has been produced by the displacement of the area, or field of illumination, upon the field of examination. (Fig. 3.)

Looking directly inside of the apparatus while still holding the mirror in place, it will be observed that the area of illumination in the retina which at first covered from 1 to 4 mm. is displaced from 2 to 5, this extra millimeter being afterwards invisible to us thru the pupil. Thus the fundamental fact in the formation of the shadow has been demonstrated, viz., *the displacement of the field of illumination upon the field of examination.*

VI. The field of illumination or area illuminated on the retina, is formed by the incoming rays and changes in size and shape according to the distance from the source of light to the eye and the different positions of the retina in regard to the lens. In a general way, it takes the form of the pupil or the diaphragm thru which the rays of light have passed, except in emmetropia or slight ametropias, when the retina becomes the conjugate focus of the source of light; in this case the image of the latter and not a circle of diffusion is painted upon the retina.

To prove these facts, the eye is provided with a slide, bearing apertures of different shapes, triangular, quadrangular, and L shaped, which can be placed before the pupil.

The inner cylinder is withdrawn

from the eye and the pupil illuminated with the mirror by an assistant at the ordinary distance (1 meter). Using a piece of white cardboard, the beam of light is intercepted behind the pupil inside the outer cylinder. Between the lens and its focus, an illuminated area corresponding in shape to the diaphragm (triangular, T shaped etc.) is easily observed, this area of lght being erect. Placing the screen in, or near

Fig 3. Displacement of the field of illumination Fi, upon the field of examination F.E. as measured on the scale upon the retina in an H eye. The movement of the mirror leaves in shadow—represented in red color—one millimeter at the right of the patient.

to the focus, on either side of it, an inverted image of the source of light (represented by the mirror) can be detected, this being the conjugate focus of the light. Further away the screen will show again a larger, more diffuse area of light, always of the same shape as the pupil, but inverted, the rays of light having already crossed at the focus.

VII. *The field of examination* is due to the outgoing rays reaching the observer's eye, and represents that part of the fundus that falls under direct observation thru the pupil; being limited by the size of the patient's pupil, whose image is painted upon the retina of the observer; the latter exercises his accommodation, *not for seeing the patient's retina but his pupil.**

With a round opening the field of examination is round; with a triangular, quadrangular, T shaped, etc., the pupil takes the same form and becomes triangular, etc., the shadow assuming the shape of the side of the aperture from which the light has moved (Fig. 4). This in all forms of ametropia.

The field of examination (or skiascopic field) is entirely different from the ophthalmoscopic field. This, according to Helmholtz, is limited by the image of the observer's pupil forming

Fig. 4. The change in the form of the pupil, changes the shape of the field of examination and the shadow.

itself upon the patient's retina. Parent, Landolt and others have advocated the same principle for skiascopy, but conditions here are different; the distance between patient and observer is far greater than in ophthalmoscopy, and in skiascopy the structures of the interior of the eye are not to be seen and in fact must be disregarded, should they appear in view. For this reason, the name *Retinoscopy* is a bad one, and must be substituted by the more appropriate and accurrate one of *skiascopy.*

To prove experimentally that the size and shape of the observer's pupil have no influence on the skiascopic phenomena, diaphragms of different forms but of smaller size than the pupil can be placed behind the aperture of the ophthalmoscope, or eserin may be instilled in the physician's eye; neither of them having any influence upon the form, direction, intensity, etc., of the light and shadow.

Varying the refractive conditions in the schematic eye, the shape, intensity and rate of movement of the shadow will be easily recorded.

For the study of optical conditions in astigmatism, cylindrical lenses are placed

*Wishing to emphasize the importance of the pupil as a diaphragm in the production of the shadow, the author suggested for this method some years ago, the name of *coreskiascopy;* that is: to see the shadow of the pupil.—*La Clinique Ophtalmologique,* October 10, 1897.

in front of the eye at any desired axis, and the changes in the pupil and in the image on the retina are readily ascertained by the same methods stated above.

OPHTHALMOSCOPY.

When the schematic eye is used for ophthalmoscopy, the light must be placed at a lower level, in such a position that the retina shall remain in darkness.

The upper window will allow the study of the changed optical conditions in the

Fig. 5. Schematic eye for teaching skiascopy and ophthalmoscopy.

illumination of the retina, when using the concave mirror in the indirect and direct methods; and by the examination thru the pupil of the scale and figures, a way of ascertaining the extent of the field of observation and the comparative amount of magnification is easily obtained.

Indirect method. The path and nature of the incoming rays can be ascertained, and the exact place of the focus of the concave mirror determined by holding the latter at the proper distance from the eye (40 to 45 cm.), and using a screen to cut out at different distances the rays reflected by the mirror.

Near this focus, a bright circle made of convergent rays is obtained; further away a real and inverted image of the lamp appears on the screen, and then a larger and more diffuse area made of divergent rays falls on the eye.

This divergent beam enters the pupil and lens, and after refraction illuminates the retina either by a convergent bundle, or as a conjugate focus giving the image of the mirror itself, or as a divergent circle of diffusion, according to the distance of the retina from the lens. The illumination forms on the retina a comparatively small, almost immovable area; but by the interposition of the objective convex lens, it becomes larger and brighter, and moves on a greater surface of the retina when the lens is slightly shifted from its place. This explains why, by observing thru the pupil the scale in the retina, the ophthalmoscopic field appears much larger than the area which the mirror alone can illuminate.

The figures drawn below the scale give to the student a much more accurate way of obtaining a clear image of the fundus, than the ordinary picture of the papilla and vessels. They are seen inverted, and its perfect clearness can be secured in different refractive conditions, only if the observer comes closer to the eye in strong myopia or moves farther away in hypermetropia. Then follows the finer focussing by the movement back and forth of the objective lens. The inverse relation between the size of the field of examination and the magnification when object lenses of different powers are used, can be easily ascertained. With a +20 D. lens a larger field and smaller magnification is obtained than with a + 17 D. or + 13 D.

Direct method. The rays from the concave mirror entering the pupil before coming to a focus, are always convergent, and made still more so by the eye lens. The illuminated area in the retina is larger than with the indirect method, and suffers little change in different refractive conditions, becoming larger in myopia.

The field of examination thru the pupil is smaller than the field of illumination and smaller than in the indirect method, but its extent can be increased by moving the mirror in different directions. On the other hand the magnification is much larger.

The figures in the scale in emmetropia are seen clearly only when the observer relaxes his accommodation entirely, and in myopia and hypermetropia, when minus or plus lenses are brought in succes-

sion behind the aperture of the ophthalmoscope, until the error of refraction is thoroly corrected.

The path of the rays coming out from the observed eye in emmetropia and ametropia during the examination of the fundus is the same as in skiascopy, considered above.

AMBLYOPIA EX ANOPSIA AND RECOVERY OF VISION.

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Quoting a case of vision acquired in adult life, this paper considers historically the views regarding amblypia connected with squint. It then reports clinical cases in which marked improvement in the vision of the amblyopic eye was obtained by prolonged training. Read before the St. Louis Ophthalmic Society, October 28, 1921. See page 391.

Years ago the terms Amblyopia and Amaurosis had about the same diagnostic significance and importance in ophthalmic practice that were possessed by "dyscrasia," "scrofula," or "dropsy" in general medicine.

Gonin[1] quotes the humorous definition of these terms given by some ancient professor to his students as follows: "When the patient sees nothing and the physician can see nothing then you are dealing with an "amaurosis." If on the contrary, the patient can see a little but the physician still can see nothing it is an amblyopia.

The use of the ophthalmoscope with its possibilities for more accurate diagnosis progressively discouraged the resort to such vague terms in ophthalmology, just as scientific study of patients is gradually eliminating their analogies in general practice.

There remain, however, a number of cases with loss of vision in which demonstrable ocular lesions are conspicuous by their absence. These Gonin classified in six groups:

First; Visual disturbances resulting from organic lesions of the brain (including hemianopsias, hemiachromatopsias, cerebral blindness), and various degrees of disassociation between the visual centers and other cerebral centers.

Second; Symptomatic amaurosis due to the effect of toxins on the brain, as in uremia or lead poisoning.

Third; Subjective phenomena due to transient vasomotor reactions, as in ophthalmic migrain.

Fourth; Amblyopsias or amaurosis with no probable cause other than disturbance of psychic perception, as in hysteria.

Fifth; Amblyopias resulting from failure to use the peripheral organ of vision or to a lack of education of visual centers; amblyopia ex anopsia.

Sixth: Visual disturbances related to the phenomena of retinal adaptation including hemeralopia, nyctalopia, certain disturbances of color sense.

Perhaps no group of cases suffering from loss of vision without evident ocular disease is more important when measured by their frequency, the customary neglect, and the benefits obtained by proper treatment than those in class five, namely, cases of true amblyopia ex anopsia. True amblyopia ex anopsia is really an acquired disability.

It was well known that permanent impairment of sight remained in cases of congenital cataract, or corneal scars following ophthalmia neonatorum, even tho good vision was made possible later by operation. The question whether such amblyopia was due to functional inactivity or to congenital disability aroused considerable discussion. Where both eyes are involved, the restoration of vision later in life brings interesting phenomena which demonstrate the necessity for educational development of the visual centers and their cerebral associations.

A report made by Marc Dufour[2] in 1876 concerning a young man (N.M.) 20 years of age, on whom an extraction

of congenital cataract on one eye was done with excellent optical result, may be quoted as a classical example from ophthalmic literature. The following are extracts translated from the notes in which Dufour describes the first tests of vision.

"N. M. being seated with his back toward the window, I caused him to look at my hand which I was moving in front of my dark clothing. Do you see anything?—*Yes, I see something bright.* What do you think it is? *It is—It is* (This was the stereotyped response which I received during numerous examinations when it became necessary to interpret ocular sensations.) Do you not see something which moves? *"Which moves?"* I stopped and then repeated the hand movements and asked N. M. to notice what was moving but got no response, except when I insisted that he say something, he repeated *"It is something white."* I admit that this first attempt left me much embarrassed.

I stopped and examined the eye. The pupil was of a velvety blackness. The eye was free from inflammation or other disturbance except a slightly conical cornea and nystagmus. I now resumed the tests, telling the patient that I was showing him my hand and placing it in a variety of forms, closing the fist, extending one or more fingers and sought to have him indicate or interpret any change he might notice in his retinal images. The patient was apparently watching carefully but made no response, and was not able to tell me if he saw or did not see changes in the objects at which he was looking. Swinging the hand back and forth failed also. I only obtained a few grunts "euh," and finished with the conviction that some serious lesion existed in the ocular fundus. I reapplied the bandage.

On the following day an ophthalmoscopic examination failed to reveal any abnormality in retinal vessels or disc. On resuming the tests, I placed the face of my watch one foot away, in front of his eye. He answered without hesitation *"I see something white."* Is it something round or square? No response. Do you know what a square is? He placed his two hands in contact by their radial border so that the palms formed a right angle. And what is round? He curved his hand and fingers making almost a closed ring. He, therefore, understood both round and square. Altho he evidently directed his attention toward the watch, he was unable to tell whether it was round or square.

On the following day, with the same question, there was the same lack of capacity to respond. I then permitted him to touch the watch. Immediately when his hand seized it, he said, *"It is round. It is a watch."* He named with precision the blue color of a necktie worn by one of the attendants without associating any other fact with the color. Its form remained unknown, nor did he seem to notice the presence, form or height of the person who wore the tie. I then showed him my watch chain which hung around my neck. He said, *"It is yellow. That moves."* (As I was swinging it.) That was his first recognition of movement. On the first day he was not able to distinguish a large movement (hands), now (third day) he recognized a small one. I infer from this test that the distinction between repose and movement by the aid of vision is something which must be acquired. Until then N. M. had known only how to feel a movement, now he had learned what it was to see a movement. The impression of movement therefore seems to be even more elementary than any visual notion concerning the form of objects."

Gonin[1] comments that most persons subjected to cataract operation are able to recognize motion before operation, which renders the careful and detailed observations of Dufour in the above case more valuable as they are rarely possible.

A. von Hippel[3] reported a similar experience with a girl 4 years old, who easily recognized movement in a horizontal direction and would imitate it with her own hand, but was unable to indicate the direction of the same movement when made vertically. The explanation apparently was that bright

objects, the motion of which an infant having congenital cataract might notice, are usually moved on an approximately horizontal plane.

A number of observers have reported in detail on the interesting development of vision in this class of cases, including the misinterpretations as to size and character and relation of rather familiar objects—such as mistaking a pencil for an umbrella—inability to understand that the house is larger than the room, or that the distant mountain peak is higher than the garden wall, etc. So unconsciously has the ability to see been acquired by most people, that the fact that every intelligent act of binocular vision is truly an accomplishment involving coordination and cerebral interpretation of a high order needs to be emphasized.

This complicated visual act can be suppressed for one eye or the other. For example, in certain occupations as in watch making, in microscopy, etc. it becomes desirable at times to confine the intelligent attention of the individual to the eye using the special lens or optical instrument. At the beginning it may be necessary to close the opposite eye to escape the confusion incident to its totally different retinal impressions, but soon the brain learns to suppress these disturbing sensations without the actual physical intervention of covering the eye to keep them out. After such temporary interruptions, binocular vision is resumed without change in the visual acuity of either eye, but the eye habitually used for such a purpose develops such a quantity of visual memories by cerebral association, that it becomes difficult after a time to substitute the other eye for this special duty. Can vision in one or both eyes be suppressed so long that it will be forgotten?

Von Graefe[4] in 1855 reported that a child which had suffered from blepharospasm for 11 months had remained unable to distinguish more than strong light for a period of three or four weeks, but had regained normal vision after three months. He reported this case in connection with a discussion of glaucoma, and expressed the opinion that the loss of vision was due to prolonged compression of the eye. Schirmer[5] in 1879 reported two cases of the same type and agreed with von Graefe as to the etiology.

The following year Leber,[6] on the basis of two new observations, doubted that pressure from blepharospasm was sufficient to provoke loss of vision of such duration. He pointed out the lack of any resemblance between the resulting amblyopia and chronic glaucoma. The pupillary reaction remains normal even with complete blindness, and the ocular fundus showed no pathologic changes and no excavation of the disc. Poor vision remained unchanged for many days and then returned to normal spontaneously. On these facts, Leber based his conclusion that the loss of vision in these cases was due to nonuse. That there was a psychic loss of vision—vision was forgotten—following a voluntary exclusion of visual sensations rendered annoying by the lid spasm; just as in strabismus the confusing image of the deviating eye is first voluntarily and then unconsciously suppressed, while both eyes remain open. Uhthoff[7] promptly accepted this explanation. But Silex,[8] belonging to the group who denied the possibility of development of an amblyopia from nonuse, insisted that it was impossible for a child of three or four years of age to forget to see in the course of several weeks or months. Wilbrand and Saenger,[9] also, were not satisfied with Leber's explanation, and advanced the theory of some perturbation in the elaboration of the photochemic substances in the retina.

As above noted many ophthamologists have reported marked impairment of sight where one eye had been placed at a disadvantage with regard to the other, thru opacities in the media or thru considerable anisometropia, even when opacities were removed or obviated or anisometropia was corrected. According to Silex these eyes were congenitally defective. The bulk of clinical evidence, however, seems to indicate that in most cases the low vision was an acquired impairment

from nonuse during a period when practically *all* cerebral attention was given to the more perfect visual impressions obtained from the better eye. The weaker eye thus actually "forgot" how to see.

The following clinical report of a case first seen one month ago is rather unique in my experience. It belongs without question to that group where amblyopia has occurred as a result of simple suppression of vision.

Sept. 16, 1921, D. L., aged 8, white, male; native of Texas Co., Mo. Had diphtheria four years ago, and has been closing the right eye ever since as he does not see well with it.

Without correction R. E. V=15/200; L. E.= 20/15. Ophthalmoscopic examination reveals nothing abnormal in either eye, but indicates a hyperopia of 5 diopters in the right eye and 2 diopters in the left. Ophthalmometer showed—

R. E. As. O. 50 Mc. Vertl.
L. E. As. O. 75 Mc. Vertl.

The statement of the mother and the boy, that before he had diphtheria he could see well with each eye was scarcely to be doubted. It is easy to understand that the amount of anisometropia found here would not prevent the development of good binocular vision, as long as the accommodation was unimpaired; but when—as appears from the history—a paresis of accommodation occurred, as not infrequently happens after diphtheria, the blurred vision of the right eye, due to the larger amount of hyperopia, became annoying and he closed his right eye to have easier and clearer vision with the left eye only.

As a result of this suppression, it is surprising that an actual squint has not developed. Its absence may be explained partly by the failure of the paralyzed accommodation to excite excessive convergence, and by the existence of well developed binocular vision before his illness, so that he found it impossible to suppress the images of the right eye without actually closing it, until the amblyopia had become so marked that no notice was taken any longer of its retinal impressions.

With correcting glasses the vision of the right eye was improved to 20/150. By forcing the right eye into use thru constant occlusion of the left, for the past month, we have been able to raise the vision in the amblyopic eye to 16/50 with correction. This improvement constitutes the best reason for continuing along the same line.

It is a common experience to find that eyes having a considerable degree of astigmatism do not have normal vision even with correction. Javal asserts that after the most perfect correction possible for astigmatism, certain persons will retain a predilection for the lines which they saw best with the naked eye, because the retina never having been able to distinguish fine details in the defective meridian remains less sensitive to them when they are reproduced thru lenses.

Hess[10] suggested that the failure to obtain perfect vision after correction of astigmatism was due to a failure of the cylinder lens in some cases to convert the rays of light into a "homocentric" bundle, thus causing diffusion zones on the retina, but G. Martin[11], who methodically tested the powers of retinal differentiation in the different meridians of the astigmatic eye, found that in one meridian the visual acuity was normal while in the meridian perpendicular to it the best proved to be one-half or one-third of normal, and that this latter meridian corresponded to the one in which the astigmatic diffusion was greatest.

Martin's investigations thus fully confirm Javal's assumption and make superfluous the ultratechnical explanation of Hess. Martin's meridional amblyopia in astigmatic eyes was found most often to occur in cases where no attempt was made by accommodative effect to neutralize the astigmatism. Gonin adds that patients in whom this amblyopia is most marked are the ones who complain least of the asthenopic symptoms. It seems, therefore, that we may have serious general loss of vision due to functional disuse in one or both eyes and even diminution of visual acuity in certain meridians of one eye for the same reason. It is im-

possible to state how long a period of nonuse must exist to permit development of actual forgetfulness of conscious vision.

Worth[12] claims that due to suppression of vision in the crossing eye, incident to constant unilateral squint beginning at the age of six or eight months, the power of central fixation is often lost in eight or ten weeks. But that where the child is two or three times as old (18 or 20 mos.) before squint begins, some five or six months usually elapse before central fixation is lost; that in a child of three years it requires about a year, and that he has never seen the ability to fix on the macula lost where the child was six or more years of age when squint began. While not in position to confirm these rather categorical statements, which Worth makes on the basis of an unusually comprehensive study and experience, it is reasonable to suppose that the conscious visual act, which is an acquired faculty is less likely to be forgotten the longer it had been established by previous use.

In the consideration of the amblyopia of the nonfixing eye in strabismus convergence, von Graefe, Donders, Javal, agreed without hesitation that it was the result of nonuse. But Schweigger[13], Abadie[13], Alfred Graefe[13] and Silex refused to accept this explanation and insisted that the amblyopia was congenital and existed prior to strabismus. The latter based his argument on three premises: (a) There are no definitely known examples of lowered visual acuity following after the onset of strabismus; (b) a number of persons fail to show any amblyopia even tho suffering from strabismus for many years; and (c) the visual acuity of the crossing eye can not be improved by exercise or by operation.

Every oculist who has studied and treated cases of strabismus with an open mind—especially along the progressive lines emphasized by Worth—will be able to prove by his own case records that Silex was mistaken in the first and third of his propositions, and that his second premise furnishes a part of the proof against his own conclusions. In this second group in which the visual acuity is not damaged in either eye, in spite of strabismus of many years standing, are found those cases where the strabismus is alternating—where by alternating fixation both eyes are kept in use; and it is this constantly recurring use of each eye for vision which preserves its efficiency.

Long before the publication of Worth's careful analysis of hundreds of successful cases of redevelopment of good binocular vision, Javal, Parinaud, Meyer and Vossius[14] had published reports of marked improvement by exercise or operation. Also, it had been noted in cases reported by Panas[14], Klein[14], Bielchowsky[14], Heine[14], etc., where vision in the better eye was lost thru accident or disease, that vision in the amblyopic eye began to improve on account of forced usage.

The following case is a similar example:

E. S., white, male. First seen December 20, 1915; age 10 years. Left eye had turned in since 14 months of age. Right eye struck with nail, producing traumatic cataract two months ago. Thru fragments of lens and capsule—right eye V.=2/192. Left eye with correction V.= 16/60.

Six years later (Nov., 1921). Has been wearing glasses constantly and has depended on sight of left eye instead of aphakic right eye, and vision in left eye with correction now equals 16/15.

Worth's report emphasized the fact that in cases treated early in life, as soon as possible after the development of the strabismus, the restoration of good vision in the amblyopic eye was more likely to be achieved, and adds that "congenital" amblyopia apart from squint is very seldom met with.

The earliest beginning with any of my patients was made with R. D. at age of 5 mos. (Nov. 22, 1908.)

Right eye had shown constant unilateral squint for two months. Right eye follows light with difficulty when left eye is covered, but abduction is not restricted.

Used atropin 1% in fixing (left) eye.

Ophthalmoscope shows fundus normal, media clear.

Under atropin H. 8 R. and L.

After using atropin daily in left eye for two months, and in addition covering left eye one hour daily, was able to fix with right eye without covering left eye. Central fixation in the right eye which had practically been lost, was thus restored. Continued atropin in left eye at longer intervals for 4 months more, at which time patient was fixing almost constantly with right eye.

May 7, 1909—age 11 months. After retinoscopy under atropin; right eye +3. Sph. Left eye +3. Sph., which was worn without remonstrance. One month later fixation with left eye again predominated. Changed left glass to + 4. Sph. Continued restraint of left eye by overcorrection for one year more, when glasses were made + 3.50 Sph. each eye. After two months fixation by original fixing eye (left) again predominated. Changed glasses giving advantage to right eye by overcorrection of left. Was last seen August 29, 1921—nearly 13 years after beginning treatment. Vision with full correction is 16/15 in each eye. He has a moderate degree of alternating strabismus, which should have correction by operation as soon as parents will consent. With amblyoscope he has a fair degree of binocular vision.

Any method which provides for enforced usage of the deviating amblyopic eye will be followed by improvement in its vision, if begun early enough and persisted in, and there is no latent defect, acquired or congenital.

In early stages the deviating eye may get sufficient advantage to put it back into active service by blurring the vision of the fixing eye, thru the use of atropin repeated every two or three days to maintain this effect as long as desired. Except in case of very young infants, this restraint on the vision of the fixing eye should be accompanied by the constant wearing of as accurate a correction for the deviating eye as can be determined, to stimulate the development of its best possible visual acuity. The use of a perfect correction for the *fixing* eye is not necessary nor always desirable; as the mydriatic sufficiently suspends the deleterious effect of the accommodation upon the excessive convergence, and as a perfect correction will permit the good vision of the original fixing to predominate in the visual act with the exclusion of the *amblyopic* or deviating eye. Better vision in the latter can only be developed quickly and satisfactorily by constant and exclusive use for a time.

The restoration of vision in the *amblyopic* eye should always receive the first and foremost consideration in the treatment of strabismus. The perfect development of binocular fusion can only be secured after vision has been in a measure restored, while the cosmetic effect of straight eyes can be secured by operation practically at any time, if the use of correcting lenses does not seem sufficient for that purpose.

If the use of atropin as above noted, with good correction for the deviating eye, is not sufficient to bring the latter into constant use or undesirable on account of photophobia, local irritations, etc., it may be desirable to use instead a strong convex lens over the fixing eye. This glass at first should be a sufficient overcorrection to restrain considerably the vision for distance in the fixing eye, thus giving the advantage to the deviating eye. To make sure of this, it is merely necessary to satisfy oneself by inspection at intervals that the patient is now actually fixing with the formerly amblyopic eye for distance. Sometimes it is desirable to order the overcorrection on the fixing eye of such an amount that the patient will use this overcorrected eye for near work and the other eye for distance, thus keeping both eyes in use. This may be useful where the patient lives at some distance and cannot be reexamined as often as otherwise desirable. By limiting the amount of near work, the original amblyopic eye may receive enough use for distance to stimulate its development.

Due attention must be given to a natural tendency on the part of the young patient to overcome the handicap thus imposed on his better or fix-

ing eye by simply looking over the glasses. We may avoid the use of an actual occlusive bandage over the fixing eye in some cases by placing a film of paraffin over the spectacle lens, or substituting temporarily a ground glass in front of the fixing eye and using atropin in that eye to prevent any satisfaction by looking over it. The best restraint and the quickest results in the opposite eye are usually obtained by actual occlusion of the fixing eye by a pad, fixed in position over it with strips of adhesive, or better still by a piece of gauze made to adhere to the face by a border of collodion. Worth, who advocates the former method, states that such a bandage can be worn for a week without change without the slightest harm to the eye. With the use of acetone to soften the collodion border, (suggestion of Dr. W. E. Shahan) rendering its removal possible without the slightest discomfort or abrasion of the skin, this "collodion" method combines the advantages of easy application or removal with neatness, comfort, and effective retention in position. Hence the parent or nurse may renew the occlusive dressing daily if desired.

Worth states that "if occlusion of the fixing eye is going to do much good, one usually finds a very great improvement in the vision of the squinting eye within three weeks. If the improvement has not taken place by the end of two months, the case is almost hopeless, tho further persistence is sometimes rewarded with success."

In this connection the following two cases are of interest:

Esther S., aged 6, first examined Sept. 13, 1909. Left eye turns in for four years. Under care of a late well known and competent German oculist for last three years, who ordered present glasses: Right eye + 1.25 Sph. Left eye + 3.25 Sph., and stated that left eye was naturally weak and made no special effort to develop it.

Right eye V.= 16/20. Left eye V.= 3/80. No power of central fixation left eye. Cries when right eye is covered and is asked to look with left.

Ophthalmometer—O.D. As 0.50 Mc. Vertl.; O.S. As 0.50 Mc. Vertl.

Ophthalmoscope — Fundus normal, media clear each eye, hyperopia approximately 5 diopters.

Under atropin, right eye showed hyperopia 4 diopters, vision 16/20. Explained to father, an intelligent clergyman, that an attempt should be made at once to redevelop vision in the crossing eye by occlusion of the fixing eye. Must go home first so as to arrange to stay longer. Prescribed—

Right eye + 4. Sph. (new)

Left eye + 3.25 Sph. (As it is.)

One week later; position of eyes better, due to full correction of fixing eye. With glasses, right eye vision = 16/20. Left eye vision = 3/160 (no improvement). Tried covering right glass with paraffin film, but patient twists head so as to look over spectacles. Placed on occlusive dressing with collodion over fixing eye. Must be led by hand to avoid collisions with furniture, etc., in walking. Position of axis of left eye points 20° toward nasal side, when asked to look at object straight ahead "false macula." After 10 days, vision in the left eye with her own glasses was 16/120 (from 3/160 when treatment was begun); but she had not yet gained perfect fixation. If a certain letter was pointed out, she would apparently involuntarily name the one next to it on the nasal side. This phenomenon was transient, being noted only on one day, and may be explained by conflicting impressions from the false and true macula. The false or eccentric fixation was not quite overcome, so when she was asked to look at a letter this part of the retina was directed toward it, but the true macula still directed slightly toward the nasal side was beginning to dominate the visual act; so it was the letter next in line, on the right (or nasal side) of the one pointed out, which she read invariably during the test on that day. Occlusive dressings of the right eye were continued for two months, until perfect fixation was possible with O.S. and vision raised to 16/60. Then restraint of right eye was continued thru paraffin covered lens, and later by strong convex

overcorrection for right eye. The patient was kept under observation at intervals of two or three months, with occasional readjustments of lenses, and in March, 1911—18 months after beginning of treatment for restoration of vision in the left eye—her vision with correction was 16/20 in each eye. The eyes were perfectly straight, and she had perfect binocular vision and depth perception with the stereoscope. The restriction of overcorrection for the original fixing eye was now removed, and six months later (Sept., 1911) it had again become dominant eye, and vision in the original deviating left eye (tho now straight) had dropped to 16/60. Resumption of the overcorrection on the fixing eye was followed by prompt improvement in the former amblyopic eye.

This patient was last seen in May, 1921, nearly twelve years since the treatment above outlined was begun. She is now 18 years of age. For two years she has been wearing simply a correction for her ametropia, without overcorrection. Her glasses are: Right eye + 2. Sph. Left eye + 4.50 Sph. + 1. Cyl. Ax. 90°. With this correction her vision is 16/12 in each eye and binocular vision is perfectly established according to tests with stereoscope.

In the next case the improvement of vision in the crossing eye was equally striking, but it required greater persistence with occlusive pad over the fixing eye.

June 19, 1920; Josephine H. Age 9, resident of Western Kansas. Father, grandfather, maternal uncle are physcians; so treatment with glasses was begun at an early age, but no special effort was made to restore vision in the amblyopic eye by any oculist consulted, as it was regarded hopeless. Right eye V.= 16/10. Left eye V.= 16/200+.

Ophthalmometer: Right eye As. 0.75 Mc. 105°. Left eye As. 1.75 Mc. 105.° Ophthalmoscopic examination revealed nothing pathologic. Wearing glasses which measure + 2.50 Sph., right and left. Began use of occlusive pad attached with collodion over right eye at once.

After retinoscopy of left eye: Prescribed. Right eye—no change. Left eye + 3. Cyl. Ax. 105.°

July 28, 1920, (six weeks later), leaves for Kansas—occlusive dressing to be continued. Left eye, with glasses vision increased to 16/50.

Oct. 6, 1920, nearly four months after beginning, is still using occlusive dressing on right eye. By trial—O.D. Hm. 2.50 V.= 16/15, O.S.M. 0.50 Ah. 3. Mc. 105° V.= 16/50. Has binocular vision with Worth amblyoscope and occasional fusion. May continue occlusive dressing on right eye, but explained to father that there was little hope of further improvement.

Jan. 5, 1921. Restraint of original fixing (right) eye has been continued —a total of 6 1/2 months.

With own glasses, left eye now has vision of 16/20 (from 16/50, 3 mos. ago). Ordered convex spherical overcorrection for the right eye sufficient to give left eye the advantage for distance vision. Right eye + 3.50 Sph. Left eye + 3. Cyl. Ax. 105°.

With these glasses, fixes constantly with left eye, except when looking at objects about one foot away when fixation is shifted to right eye. One month later, (Feb. 10th), measurements and vision same. Goes back to Kansas.

Three months later, (May 24), fixing constantly for distance with left eye, in which vision equals 16/20+. Tried reducing right glass to + 3. Sph. to lessen overcorrection.

One month later, (June 22nd), fixing now with right eye for distance. Replaced restraint on right eye by overcorrection, changing right glass to + 4. Sph.

One month later, (July 18th), still fixing with right eye in spite of overcorrection and vision in left eye = 16/30+. Increased overcorrection of right eye by changing to: Right eye + 6. Sph. Left eye + 4. Cyl. Ax. 105°, with which vision in the left eye was 16/20.

It is noteworthy that vision in the amblyopic eye was restored more rapidly in this case, due to the constant occlusion of the fixing eye over a much

longer period (more than 6 mos.) which was made possible by the cordial cooperation of intelligent parents. The father is also supervising the training of fusion with the aid of the amblyoscope. Even under these favorable conditions it is necessary to maintain a definite advantage in distance vision, for the eye which has so recently regained the possession of this faculty. As soon as the original fixing eye is given an equal opportunity, it seems from long habit to dominate the visual association tracts to cerebral centers, to the exclusion of its fellow eye, and the reduction in visual acuity from lack of attention again becomes manifest. Such cases, therefore, should remain under close observation at intervals not longer than four to six months for at least five, and possibly 10 years after the beginning of treatment.

This tendency to an immediate relapse of the amblyopic eye from nonuse should be a full and sufficient answer to the first erroneous assumption of Silex, that no eye has been shown to have lost vision from nonuse in strabismus.

Perhaps reference to the results in the following cases may impress this danger of relapse so often enhanced by ignorance and indifference on the part of the parents.

April 22, 1920, Leroy H., aged 9 yrs. Left eye turns in for 4 yrs. Right eye V.=20/20. Left eye V.=20/200. With correcting glasses and occlusion of fixing eye, constant for one month and thru overcorrection for 4 month longer, vision in left eyes was improved to 16/30. Then overcorrection of right eye was reduced. Patient failed to appear for six months, when vision in the former amblyopic eye had dropped down to 20/75, where it has since remained.

Sept. 28, 1908, Virginia H., aged 8 yrs. Two years ago right eye began to turn in after spell of fever; consulted Dr. Alt who used mydriatic and was about to prescribe glasses when parents interfered and stopped all treatment. Now comes on account of crusts on eyelids and "blinking." Right eye V.= 16/200. Left eye V.=16/20.

Began treatment of chronic conjunctivitis and marginal blepharitis and ordered temporary + 2. spherical, right and left. Attempted restraint of vision in fixing eye by overcorrection and then by paraffin film, neither of which were successful as patient persistently looked over glasses or took them off, with the indulgence of a foolish mother. After more than one month's effort, during which time the inflammatory conditions about the eyelids yielded slowly to treatment, we seemed to have come to a standstill with vision in the left eye improved to 16/60 plus. As the patient persisted in disregarding instructions about the constant use of glasses, continuous occlusion of the fixing eye with pad and collodion was begun on November 7th and continued with fairly good maternal cooperation for two weeks, during which time vision in the crossing eye was brought up to 16/30 plus. Then came a girl's party which completely demoralized our program, as I did not see her again. About one week later she was taken to Dr. Ewing, who found her vision to be 20/75 in the deviating eye. She was not more amenable to treatment there than with Dr. Alt and myself, so that the final result is not at all surprising.

The last entry of vision on Dr. Ewing's record, which he kindly placed at my disposal for this report, was made in Jan., 1919, and shows vision =20/120 for the crossing eye. Comparison with the vision of 16/30 plus of the same eye when under forced usage 11 years before demonstrates, beyond question, the harmful retrograde tendency from nonuse.

Sept. 14, 1920; R. M., white, male, 3 5/6 years.

Left eye turns in occasionally during past year. Right eye vision=16/42, left eye vision=16/160. Under atropin, retinoscopy shows :

Right eye, H 1. Ah. 0.75 Mc. Vertl.
Left eye, H 1.75.
Right eye + 3. Sph.
Left eye + 1.75. Sph.

Six months later: Glasses worn irregularly. Right eye vision 20/30 and left eye=20/50. Nov. 16, 1921, (14

months later), stopped use of glasses one month after last visit, and consulted chiropractor who promised to correct strabismus without aid of glasses. Right eye vision=16/21 and left eye vision less than 16/200. Placed occlusive dressing over right eye.

Five days later: Left eye with + 2.50 Sph. vision=16/30. Substituted strong overcorrection, + 12. Sph. over right eye and continue wearing + 3. Sph. over left eye. Dec. 1st: Continues to fix with left eye when wearing glasses. Strabismus slight. With correction: Right eye vision =16/12 and left eye vision=16/12 plus.

Attention is directed to the marked deterioration of vision in left eye during nonoptical treatment by chiropractor—also, the redevelopment of vision by forced usage.

Another case where vision relapsed from nonuse is unique, thru the fact that it occurred when a convergent strabismus became changed into a divergent strabismus during the routine treatment above mentioned.

Philip B., Feb. 4, 1909, aged 4 1/2 years.

Left eye turned in about four months. With correction: Right eye V.=16/30. Left eye V.=16/120. Used paraffin covered lens and atropin, with which vision in left eye is raised to 16/30 within one month. With use of plus spherical overcorrection for right eye, vision in left eye was improved to 16/20 during next two months, (May 20, 1909). Overcorrection of right eye was then reduced, permitting equal vision in each eye (V. 16/20). Tests with stereoscope showed perfect fusion and depth perception.

When he returned six months later (Nov. 19, 1909), he showed a divergent strabismus of the original crossing eye; vision in the original fixing eye= 16/20 plus and in the deviating eye= 16/40 (uncertain). Fusion was still possible with stereoscope, but no depth perception. Vision in the deviating eye was redeveloped in a few days, by excluding direct vision in the fixing eye with a paraffin film over his right glass. During the last 12 years, it has been necessary to avoid a full correction of his manifest compound hyperopic astigmatism which equals + 2.50 spherical combined with + 0.50 cyl. at reciprocal oblique axis. Its use invariably produces a strong tendency to divergence, even actual exotropia of the left eye. He is wearing with comfort for all purposes the cylindrical portion only of the full correction. Vision in right eye is 16/12 and in left eye 16/15 with glasses, and test with Maddox rod at 16 ft. shows a slight exophoria. (March, 1921.)

Not always is it possible to regain vision in the deviating eye; but where it has been proven impossible after consistent and persistent effort, there are no vain regrets on the part of either patient or physician that "it might have been." Statistical averages based on the moderate number of cases seen in private practice are apt to be misleading. No attempt has been made therefore to report more than a few cases of special interest. Nor should it require numbers to impress the importance of making the effort for restoration of vision in all of these cases. Successful treatment in even a few cases should be an incentive to do our utmost for every one thus afflicted.

The greatest mischief wrought by the erroneous beliefs of Silex, Abadie, Schweigger, Alfred Graefe, and their colleagues, that there was no amblyopia ex anopsia, lies in the failure to encourage prompt and vigorous measures for the restoration of vision in cases of disuse, especially in strabismus. As Gonin says, those who believe solely in the congenital origin of these amblyopias (accompanying strabismus or anisometropia) naturally expect nothing from its treatment, and should save the patient the expense of time and money incident to long treatment. But those, on the contrary, who believe that functional inactivity is a most important cause for the loss of vision have both the right and duty to act in accordance with their conviction, to prevent the increase of the amblyopia and to improve the vision if there still remains an opportunity to accomplish it.

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A NEW PROTRACTOR CARD FOR VERIFYING THE AXES OF CYLINDRICAL AND SPHERO-CYLINDRICAL LENSES.

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The importance of correct placing of cylinder axes justifies the use of a special protractor card to determine if this has been satisfactorily done. The card here described and illustrated supplies the necessary data for such determinations.

The verifying of finished spectacle and eye glass lenses with regard to the accuracy of the cylinder axes and of the optical centers is a matter frequently neglected by the oculist.

In hospital dispensaries the examination of finished lenses is usually a very perfunctory process. A satisfactory device for accurately determining the axes of lenses is not available either here or in many oculists' offices.

To such an extent is this the case that an oculist who subjects the lenses supplied on his prescriptions to a critical examination and rejects those that are faultily ground, inadvertently decentered or distinctly off of the prescribed axis soon gains the reputation of being hypercritical.

While the general character of the service rendered by dispensing opticians is satisfactory, its quality will rise in direct proportion to the degree of accuracy demanded by the oculist. The desirability of continuous improvement along this line admits of no argument. The approval of a faulty lens acts detrimentally upon the wearer, reacts unfavorably upon the oculist and undermines the vigilance of the dispensing optician, in whom carelessness or lack of skill is apparently condoned. Oculists would be surprised were they to discover the extent to which their patients are wearing lenses positioned or ground at axes considerably "off" from what they prescribed. For this reason I recommend the use in every clinic and office of this simple device, a Protractor Card of new design, together with a well sharpened white China-Marking Pencil. (Blaisdell No. 164.) See Figure 1.

Rimmed spectacle and eye glass lenses supplied on my prescriptions are permanently dotted with a pointed

file or marking diamond at both ends of the 180 degree meridian of each lens —two dots on each lens.

In rimmed spectacles all four dots, in rimless spectacles, the four screw holes, must fall on one continuous line. One can readily see these diamond dots or any white pencil marks when the glasses are lying on this black card. In Figures 2 and 3 these diamond dots are purposely intensified to show their positions and to emphasize their importance.

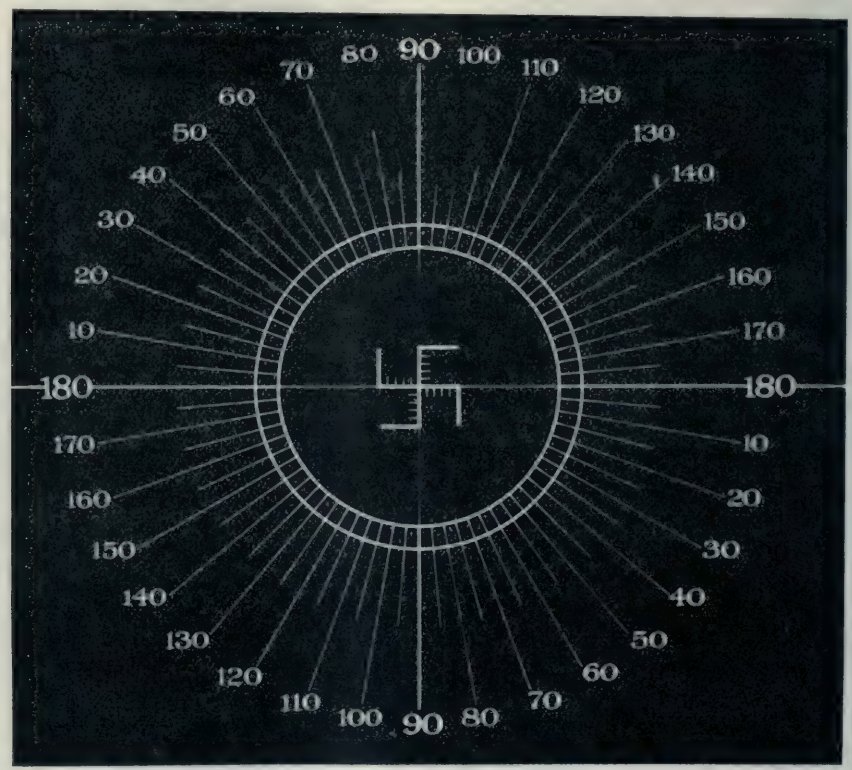

Fig. 1.—A new protractor card, photographically reproduced.

Use the central concentric circles as a guide in placing the lens to be examined, face downward in the center of the figure on the card. The two diamond dots or other points marking the 180 degree, or horizonal meridian of the lens must fall on the 180 degree line of the figure. The lens is then carefully marked with the sharp, white, china-marking pencil by two short marks, on the posterior surface of the lens, near the periphery, each short mark directly opposite the axis degree *as it was prescribed*. A spherocylindrical lens should be pencil marked also on the meridian at right angles to the prescribed axis, so that one may verify that the optical and geometric centers coincide.

The lens is then held a short distance from the card and one of the heavy straight white lines on the card is viewed thru the lens. There should be no displacement of that section of the white line on the card seen thru the lens from those sections of the same line viewed above and below and not thru the lens. If the cylinder axis is as prescribed and if the lens is not "off" center, the line so viewed will be continuous when passing thru either pair of our short white pencil marks on the lens. An "off" centered lens introduces a prismatic effect which may be highly undesirable.

The lens surfaces too should be examined for imperfections and the lens should neutralize at the marked axis.

When neutralizing, the cylindrical test lens must be held just parallel to the short white marks which we have placed on the prescribed axis of the lens to be tested. Some ingenuity must be exercised. The spherical and cylindrical test lenses must always be held in as close contact as possible with the lens to be tested. Sometimes the cylindrical test lens can be placed on one side and the spherical test lens placed on the other side of a flat lens. When testing a toric lens, try to get a good accurate contact on its convex surface with the test lenses. As you move these lenses to and fro trying to detect some apparent motion of distant objects, restrict your observation to that area of the lens which has good contact with the test lenses. Maneuver the test lenses so as to successively secure good contact in various parts of the lens. Preserve at all times the parallel of the cylindric test lens to the marked prescribed axis of the lens under test. If a slight movement of an "off focus" or "off axis" is detected, move the lens farther from your eyes and the apparent movement will be exaggerated.

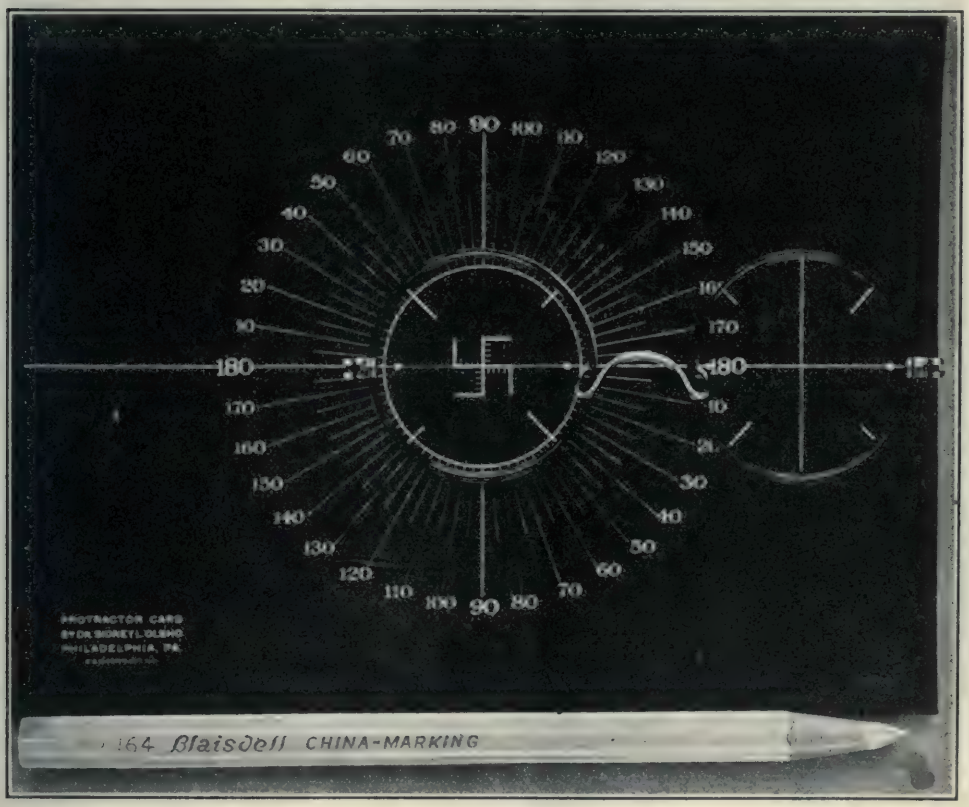

Fig. 2.—Temples removed to simplify the diagram. The white dots are permanent diamond dots on the 180° meridians of the lenses, and have been purposely intensified. Note that all four dots fall on one line. The left lens has been white pencil-marked at 45°, the axis as it was prescribed. The meridian at right angles thereto has also been marked. This lens will be cross lined vertically and horizontally thru its geometric center. The right lens has been completely marked, the prescribed axis of this lens being 135°. Axes, optical centers and foci are to be verified in the manner described in the text. When the glasses are on the face, the horizontal white lines on both lenses must always be segments of one continuous straight line, on a level with and bisecting both external canthi. The vertical white lines must fall on the visual axes.

With the aid of the protractor card, the geometric center of lenses is easily determined and it is the author's

custom to cross-line both lenses completely, vertically and horizontally thru the geometric center with the white pencil, and to note the position of these lines when examining the glasses as to their adjustment. The horizontal lines must always be segments of a continuous line. Their height must be on a level with and bisect both external canthi. Further reference to these points is found in other papers.

Reliance must not be placed on an automatic lens measure to determine exact lens axes. Such an instrument is intended only to measure lens surfaces. It may, however, be of assistance in locating axes approximately.

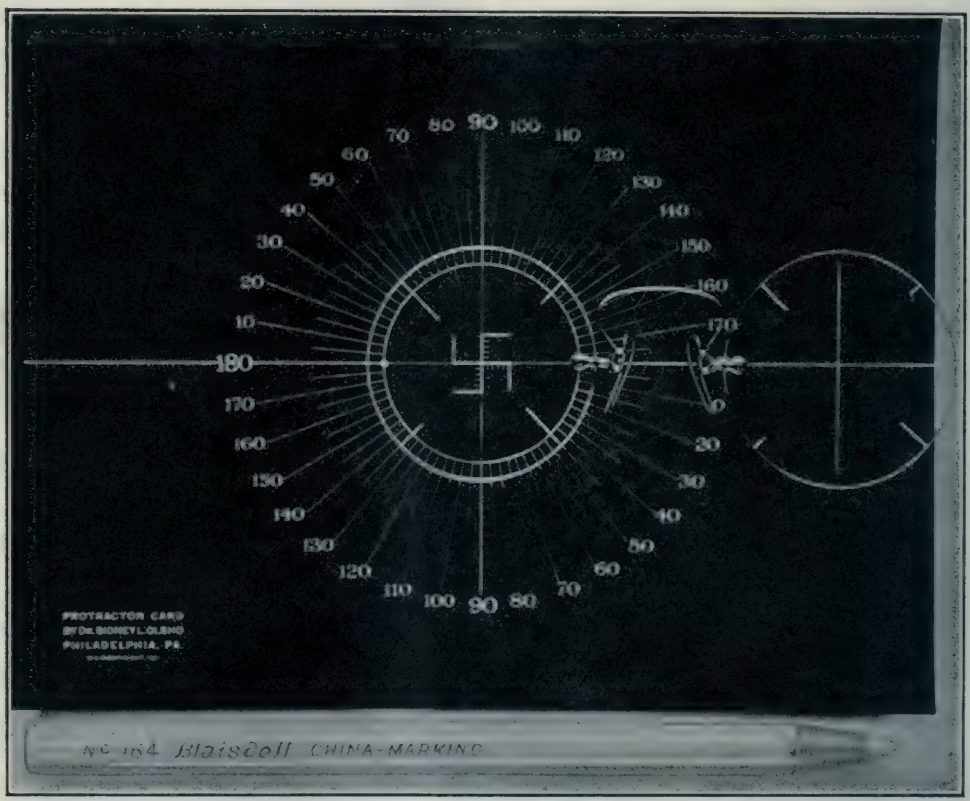

Fig. 3.—The white dots on the 180° meridians are permanent diamond dots on the lenses and have been purposely intensified. The lenses are sphero-cylindrical, the right at axis 45°, the left at 135°. The right lens has been completely marked, the work of a moment. The left lens is in position to have its marking completed. Axes and optical centers will be verified as described in the text.

The vertical and horizontal lines are necessary in the inspection of the position of the lenses when on the face. The horizontal lines on both lenses must always be segments of one continuous straight line on a level with and bisecting both external canthi. The vertical white lines must fall on the visual axes.

There are a number of complicated and costly axometers on the market, but the writer recommends the Protractor Card illustrated, as a thoroly practical device. He urges the universal and definite examination of lenses supplied on prescription.

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AN ILLUMINATED PERIMETER WITH CAMPIMETER FEATURES.

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After discussion of the conditions to be met in designing an accurate and serviceable instrument both as to illumination, background, steadiness of eye and fixation, the instrument worked out is here described and illustrated.

This apparatus was devised in response to a request from a committee appointed by the American Ophthalmological Society to work out a better standardization of the illumination of perimeters and test charts. The request was for a feasible means of illuminating the perimeter arm with light of a good intensity and quality, so that every point on the arm in any meridian in which it may be placed shall receive equal intensities of light. Intensity and quality of illumination, however, are only two of the factors which influence the results of the perimetric determination. In devising the instrument described in this paper, it has been our purpose to provide a control also of other factors which are of importance to the work of the office and clinic. The perimeter devised and to be described in this paper has been adopted by the Committee as the standard instrument for office and clinic work.

The variable factors which influence the apparent limits of color sensitivity are, so far as we have been able to discover, the wave length and purity of the stimulus, the intensity of the stimulus and the visual angle, length of exposure of the eye, the method of exposure (moving or stationary stimulus), accuracy and steadiness of fixation, the intensity of the general illumination of the retina and its state of adaptation, breadth of pupil, and the brightness of the preexposure and of the background or surrounding field. The most important of these from the standpoint of the office or clinic are perhaps the intensity of the stimulus, the brightness of the preexposure and the surrounding field, the intensity of the general illumination, and the accuracy and steadiness of fixation.

Perhaps errors in refraction should be included in the above list of factors. They differ from those factors, however, in that they are a source only, or mainly at least, of differences in breadth of field between observers, not for the same observer at different times. They are not therefore a serious source of trouble in the use of perimetry to check up the advance or recession of a given pathologic condition, but they are confusing in diagnosis. We have no certain means of telling, for example, how much of the results in any given case of high myopia is due to the refractive condition and how much if any is pathologic. To add to our knowledge on this point we are now conducting an investigation to determine the effect of various amounts and kinds of refractive errors on the results of field taking. We can not help but feel, as is stated and discussed in the paper, that a provision should be made in our practice of field taking to include one set of results under the correcting glasses, even tho it means either working under conditions which give a narrow field or being content with results which do not include the wider portions of the temporal field.

(1) *Intensity of stimulus.* By a sufficiently wide variation of this factor alone, the zones of color sensitivity may be made to have almost any breadth within the limits of the field of vision, to differ radically in shape, and even to change or reverse their order of ranking as to breadth. When pigment surfaces are used as stimuli, the illumination of the perimeter arm determines the intensity of the stimulus light. Two methods are proposed for securing an even illumination of the stimulus at every point on the perimeter arm and of reproducing this illumination from time to time.

Method 1. When the source of light is inlaid in the surface of the arm or its continuation, the illumination on this surface will be equal for approxi-

mately 180° on either side of the source. The value of this illumination at every point will be equal to the normal flux of light from the luminous surface divided by four times the square of the radius of curvature of the perimeter arm, or four times the square of the distance of the eye from the perimeter arm. A perimeter embodying this principle of illumination is being constructed in the following way. A lamp house is fastened on the continuation of a 90° arm in such a posi-

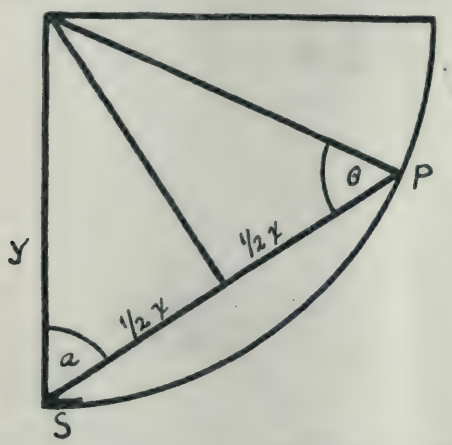

Fig. 1.—Demonstration of even illumination of perimeter arm.

tion that an opening in its surface facing the observer lies in the continuation of the surface of the perimeter arm. This opening is filled in with diffusing glass bent to take the curvature of the arm, and shaded in such a way as to shield the eye of the physician and the observer without changing or interfering with the distribution of light to the perimeter arm. The lamp house rotates with the arm and thus illuminates it uniformly at every point in all meridians.

The principle by which an even illumination of the perimeter arm is secured by this method may be demonstrated as follows: Let S, Fig. 1, be the source of light inlaid in the surface of the arm; P any point on the perimeter arm that is to be illuminated; X the distance from S to P; y the radius of curvature of the arm or the distance of the eye from the arm; a the angle of emission of the light from the source of S; and θ the angle of incidence of this light at the point P. Then the intensity at P will be inversely as the square of the distance of P from S or inversely as the square of X, and directly as the cosine of the angle of emission a, $\frac{\frac{1}{2}x^2}{y}$, and of the angle of incidence θ, also $\frac{\frac{1}{2}x^2}{y}$. That is,

$$I_1 = I \times \frac{1}{x^2} \times \frac{\frac{1}{2}x}{y} \times \frac{\frac{1}{2}x}{y} = I \frac{\frac{1}{4}x^2}{x^2y^2} = \frac{I}{4y^2}$$

in which I_1 is the intensity of light at P and I the intensity at S. From this equation is derived the law of illumination of the arm: the intensity of light at any point on the arm is equal to the normal flux of light from the source divided by four times the square of the radius of curvature of the arm.

The method has the following objections. (1) The difficulties in construction are not easy to overcome. (2) Evenness of illumination requires an approximately perfectly diffusing glass. This glass is difficult to obtain and prepare and its transmission is apt to be low. Moreover the light incident on the perimeter arm should approximate daylight in composition. The selective absorption required to correct the light from the lamp to this composition further reduces the intensity enormously. This double loss, first by absorption, and second by the somewhat wasteful type of distribution employed, renders it difficult to get an adequate intensity of illumination of the perimeter arm.

Method 2. When the source of light lies on the perpendicular to the plane of the perimeter arm at its center of curvature, it will be equidistant from every point on the arm; also the angles of emission and incidence of the beam of light will be equal for every point on the arm. A perimeter has been constructed embodying this principle of illumination. This perimeter is shown in Figs. 2-5. Two arcs of the same radius of curvature were constructed at right angles to each other; one a 180° arc, the perimeter arm; the other a 90° arc, the lamp arm, at the end of which is placed the source of

light. In order that the source of light shall sustain a fixed relation to the perimeter arm for all positions of that arm, the two arms are fastened together at the center of rotation. About the source is a housing which was designed in such a way as to shield the eye of the patient and the physician without interfering with the distribution of light to the perimeter arm. This housing is made of black japanned iron and is painted a mat black on the inside in order that as nearly as possible all of the light which passes to the perimeter arm shall radiate directly from the lamp filament. Its dimensions are 4¼x4¼x5 in. A rectangular aperture 2⅛ in. wide was cut out of the side of the housing facing the perimeter arm, at the bottom and for 3 in. back on the two adjacent sides. The relation of the lamp to the aperture of this housing is such that the light radiates freely without shadows from the filament to every point on the perimeter arm. In order that the lamp may be removed when desired, the bottom of the housing is hinged at the back and is held in place by a latch on either side. To prevent overheating, the housing is well ventilated by especially designed light-tight ventilators, four in the sloping roof of the lamp house and four on each of the sides at the bottom.

Provisions are made in the construction of the lamp house for filtering the light to daylight quality. This is accomplished in two ways. (a) A well seasoned 75 watt type C_2 (blue bulb) Mazda lamp operated by ammeter and rheostat control is used as the source of light. This is the ordinary blue bulb commercial lamp and gives only approximate daylight quality. The surface of the bulb is acid-etched to diffuse the light. The intensity of light incident on the perimeter arm when this lamp is used as source of light is 17 foot-candles. (b) A type C (clear bulb) Mazda lamp of 75, 100 or 150 watts depending upon the intensity of light desired, is used as

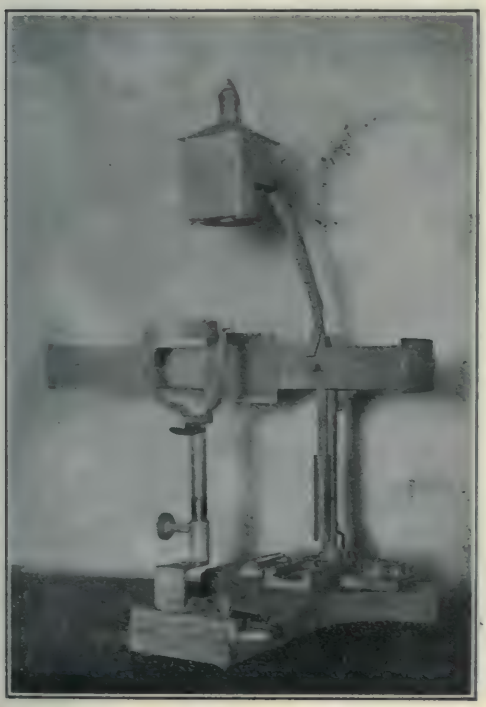

Fig. 2.—Perimeter with illuminating lamp above and target upon the arc.

Fig. 3.—Perimeter with arc and lamp swung obliquely. Arms for mapping central scotoma and sights detached.

the source. The light from the lamp is filtered to daylight quality by means of a double-etched collar or cylinder of carefully prepared daylight glass 2½ in. broad and 4 in. in diameter, which can be inserted into the bottom of the lamphouse so as to fill completely the three-sided aperture. When in position all of the light emitted from this lamp house must pass thru the filter. The collar is securely held in position by three pins so placed in the bottom of the lamp house as to form the apices of an equilateral triangle of the appropriate dimensions. This bottom is hinged so that it can be dropped down for the insertion of the collar and is provided with latches, so that it can be held securely in position when raised. The light of a type C Mazda lamp filtered by this glass is a very close spectrophotometric approximation to north skylight. The coefficient of transmission of the glass is 15 percent. The light incident thru the filter on the perimeter arm from a 100 watt type C Mazda lamp has a value of 2.6 foot-candles, an intensity very suitable for the taking of a low illumination field, the importance of which in diagnosis will be discussed later. Higher intensity fields may be obtained by using higher wattage lamps.

This perimeter is not difficult to construct or to operate. It provides for a uniform illumination of the perimeter arm in all meridians with light of a good intensity and quality; and with it a precision of control is possible which is comparable with the work of the physical laboratory. Of the two instruments we have devised, it is without doubt much the more feasible, and it is also very probably the more correct in actual practice. Both instruments are correct in theory.

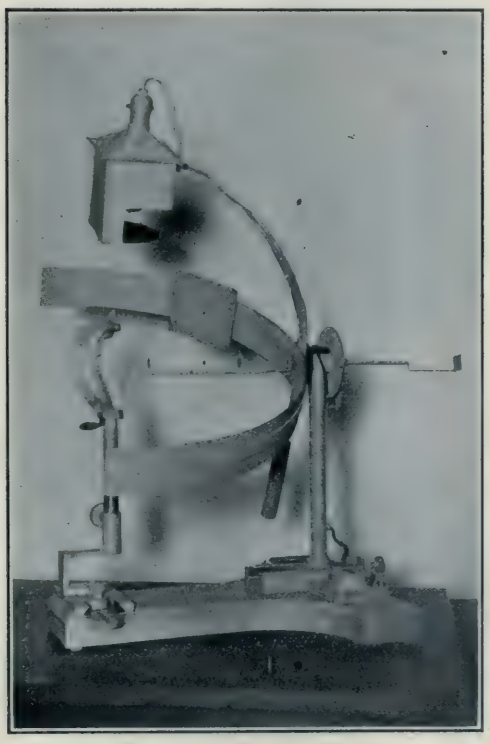

Fig. 4.—Side view of perimeter with attachments in place.

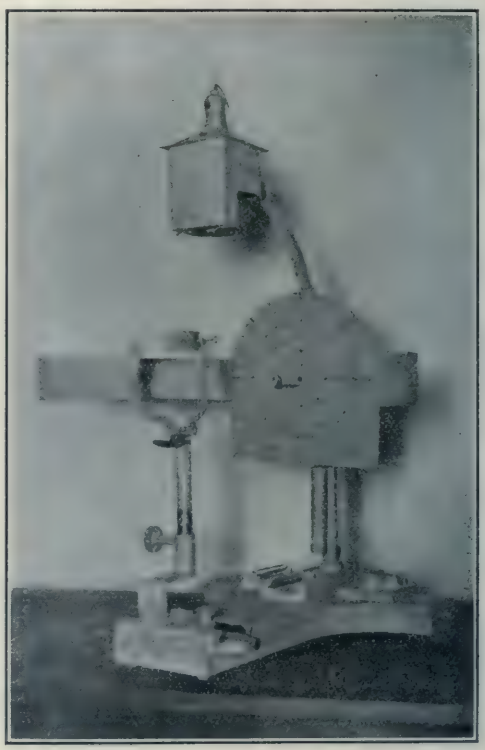

Fig. 5.—Oblique view of perimeter, showing campimeter field and sight in place.

(2) *The brightness of the preexposure and the surrounding field.* The brightness of the surface to which the eye is preexposed may change the apparent limits in certain meridians as

much as 17-20°. A preexposure lighter than the color gives a dark, and one darker than the color a light after image. These after images change profoundly the saturation of the color sensation, also its hue. A background or surrounding field lighter or darker than the color produces a similar effect on the limits, but not so great. In this case the disturbing achromatic effect is due to physiologic induction or contrast. The variable effect of brightness of preexposure and surrounding field can be eliminated only by making both a gray of the same brightness as the stimulus color. Here again a precise control of the intensity of the illumination for all points on the perimeter arm becomes important. That is, the shade of gray which is needed to match the color in brightness changes with change of illumination; therefore, the selection of a gray which will match the color in brightness for all points of work presupposes constancy and uniformity of illumination. A further advantage is gained by making the background of the same brightness, as the color. That is, when color and background are of the same brightness the stimulus disappears completely when the limit of sensitivity to that color is reached, instead of turning into a gray, concerning the colorlessness of which the patient is apt to be in doubt. This gives the effect of the disappearance type of photometer and like it adds greatly to the ease and certainty of making the judgment.

The control of brightness of preexposure and surrounding field is provided for in the following way. To the stimulus carriage is attached a light aluminum holder, No. 19 B & S gauge, grooved to hold a card 5x6 in. These cards are covered on one side respectively by grays of the brightness of the four colors, red, yellow, green and blue of the Hering standard series of pigment papers, as seen in the peripheral retina. At the center of each of these cards is pasted a disc of the appropriate color subtending a visual angle of 1°. To provide for the control of the preexposure for the stationary method of giving the stimulation, cards identical with the background cards are provided, covered also on one side with a gray of the brightness of the color. The stimulation by this method is given as follows: The stimulus is placed at the point to be tested and covered with the preexposure card. The observer is told to take his fixation. At a given signal the stimulus is uncovered for one second and recovered. In case the moving stimulus method is used, the surrounding field serves as the preexposure.

The perimeter arm and body are painted a gray of a shade which is approximately mid-gray to the blue and yellow, the darkest and lightest of the stimuli employed. In our own laboratory the perimeter is used on a table painted with the same gray and stands before a gray screen. These latter precautions, however, are not necessary.

When the instrument is supplied to the profession, provision will be made that the stimulus and preexposure cards, a seasoned lamp, and all other perishable parts can be furnished in the quantities desired.

(3) *The accuracy and steadiness of fixation.* All are familiar with the disturbing effect of inaccuracy and unsteadiness of fixation. If correct and reproducible results are to be obtained, the eye must be accurately placed at the center of the sphere in the surface of which the perimeter arm lies, and the line of sight must not shift from the fixation point while the color observation is being made. As an aid to the correct placement of the eye and a check on its steadiness of fixation, two devices have been provided. (a) A small circular mirror is used as a fixation object in which the observer sees the image of his own eye (Fig. 2). When the eye is correctly placed with the line of sight normal to the surface of the mirror at its central point, the fact is indicated to the observer by the position of the image of his pupil and iris as seen in the mirror. Not only is this simple device of service in determining the correct position of the eye, but it aids the observer greatly in holding a steady fixation.

We scarcely need to point out that a fixation object does not afford an accurate control of fixation. Exact checking methods show that the patient is not

always fixating the object when he thinks he is. The only guide to monocular fixation is clearness of seeing, and this is a criterion that presents considerable latitude. However with a mirror, the patient has an objective check on the position of his eye.

One of the objections to the use of a mirror as a means of controlling fixation is the likelihood of glare from its surface, probably due to a combined specular and diffuse reflection rendering, in proportion as it occurs, the clear seeing of the image of the eye by the patient unnecessarily difficult. This objection has been obviated in the instrument described by cutting off the direct radiations from the lamp from the mirror by a narrow shield, which can be turned back out of the way when not in use. With the shield in position the eye receives from the mirror only the light which is first reflected from the eye to the mirror and then back to the eye. The device adds greatly to the ease and clearness with which the patient sees his imaged eye. The elimination of the troublesome glare on the surface of the mirror is rendered particularly simple and easy in case of this instrument because of the plan of illumination employed, *i. e.*, the light all comes from a fixed source above and directly in front of the mirror. If the perimeter were illuminated from a window, for example, and its position with reference to the window changed as is needed in order to give as nearly as possible equal illumination of the stimulus in its various positions, the elimination of glare from the surface of the mirror would not be so simple a problem.

Another theoretic objection to the mirror is that the clear seeing of the iris in the mirror requires the eye to focus for twice its distance from the perimeter arm. When this distance is 33 cm., as in the present case, the use of the mirror as a fixation device throws the refracting system of the eye 1.50 diopters out of focus for the colored stimulus on the perimeter arm. Just how important this is when the problem is the mapping of the limits of color sensitivity and not a determination of acuity is difficult to say *a priori*. The poor imaging for the peripheral field is well known to all who have made determinations of acuity at points far removed from the center of the field. The additional blurring due to an error of focussing of the magnitude described is probably of negligible consequence at points having an excentricity of 30—70 degrees, particularly in determinations of color sensitivity. In any event, we have not been able to detect appreciable differences in the limits of sensitivity at 17 foot-candles of illumination with the mirror as a fixation device and with the other device provided, in a case where the eye is correctly focussed for clear seeing at 33 cm.

(b) The second device for the control of fixation is similar in principle to a peep-sight and may be called a parallax or peep-sight device (Fig. 5). A small disc or button (8 mm. in diameter) at the center of rotation of the perimeter arm is viewed thru a circular opening (7 mm. in diameter) in a thin round metal disc 9 cm. nearer to the eye. The plane of the disc and the viewing opening are both normal to the line of sight when the eye has its correct position and fixation. When the eye has this position and fixation, the relation of size of disc and opening is such that the disc is seen not quite to fill the opening. The disc is painted black, also the edge of the opening; thus when the eye has the proper position and fixation, the edge of the opening is seen concentric to the disc, with a narrow ring of the gray of the brightness of the perimeter arm between. The control afforded by this device is very sensitive. A very slight deviation of the position or fixation of the eye results in the complete or partial extinction of this ring at a point in the direction of the deviation. Like the mirror the device is mounted on a short pin or plug which can be inserted in the fixed tubular axle about which the perimeter arm rotates.

However, while the image in the mirror or the correct sighting of the fixation disc thru its opening will indicate to the observer when the line of sight is normal to the surface of the fixation object at its central point, there are two important features in the correct adjustment of the eye over which these devices exercise no control: (a) the distance of

the eye from the mirror; and (b) the agreement of the meridians of the field of vision as read on the perimeter with the meridians of the retina. In order that it may be known when the eye is at the correct distance from the perimeter arm, a light measuring rod 33 cm. in length is provided, to one end of which is fastened at right angles a small metal disc. In making the adjustment for distance one end of the rod is placed against the mirror at its center and the distance of the perimeter from the observer's eye is changed by means of the coarse screw adjustment to be described later, until the closed lid is just in contact with the metal disc.

Perhaps the simplest device for ensuring a constancy of relation of the meridians of the retina to the meridians of the field of vision as laid off by the perimeter arm, in other words for guarding against a slight tilting of the head to one side or the other, is a mouth bit. We have designed (Fig. 3) a very small and unobjectionable mouth bit of light wood to be changed for each observer, so shaped that it can not be bitten too far forward or back, and thus the distance of the eye from the mirror be changed, or too far to one side or the other. There seems, however, to be an insuperable prejudice against the use of a mouth bit by both the physician and the patient. We have designed, therefore (Figs. 2, 4 and 5) a head rest which follows approximately the outlines of the forehead, side of the head and face, furnished with a suitably cupped chin rest, the height of which is adjustable, also its position forward or backward. To provide for individual differences in shape and breadth of forehead, an adjustable forehead piece or band of thin spring steel extending well around to the side of the head is screwed at its central point to the forehead piece of the head rest. This forehead band is adjusted to fit foreheads of different shape and breadth by means of a set screw on either side near the two ends of the band. When the chin rest is adjusted to its proper height and the forehead band is made to fit the forehead, the patient's head is held comfortably in position and sufficiently rigid, it is believed, to satisfy the needs of office and clinic work. At least the probability of tilting the head to one side or the other, thus causing a disagreement of the meridians of the field of vision as indicated by the perimeter readings with the meridians of the retina is very greatly lessened, if not entirely obviated. This, it will be remembered, is the especial purpose of the device, the other features of the control being taken care of in other ways.

In order quickly and conveniently to locate the patient's eye at the center of the perimeter system, three adjustments are provided; a rack and pinion to raise and lower the head, a second rack and pinion to shift the head to right or left, and a coarse screw adjustment to change the distance of the perimeter arm from the eye. In the process of getting the eye in position, the patient bites the mouth bit or adjusts the head in the head rest, brings the eye to the level of the fixation device (mirror or peep-sight) with the first rack and pinion, and centers its image in the mirror with the second rack and pinion. The physician gets the correct distance of the perimeter arm from the patient's eye by means of the screw adjustment and the measuring rod already referred to. Once these adjustments are made for an eye, they need not be made again during the process of taking the fields for that eye; that is, the biting of the mouth bit or the return of the head to the head rest guarantees that the eye always returns to the same position for which the original adjustments were made.

A very great practical need in a clinic perimeter is a method of controlling fixation for patients who have a central scotoma or pathologic blind area. With the eye properly adjusted for taking the fields, these patients are not able to see a central fixation object. A device has been constructed (Fig. 3) for controlling the fixation of such patients in the following way. The perimeter arm is made to rotate about a hollow fixed axle. Into this fixed axle telescopes the stem at the end of which is the mirror or peep-sight used for patients with normal or approximately normal central vision, also a hollow stem carrying the device used to control the fixation of patients with a

central deficiency. This latter device consists of four light arms or rods at right angles to each other curved to follow the arc of the perimeter arm, and of sufficient length to provide for all probable breadths of scotoma. Each of these arms carries a small stimulus the distance of which from the center of the field is adjustable. In adjusting the patient's eye by this device, the physician looks thru a small telescope contained in the hollow tubular axle and lines up the pupil of the patient's eye with the cross hair in the field of the telescope. When the patient's eye is observed to be in position, two or all four of the stimuli as may be desired are adjusted so that they can just be seen by the patient at the edges of the scotoma. These stimuli serve as the control of the patient's fixation, his instructions being to direct the eye so that all are visible.

This fixation device intended to control the fixation during the taking of the fields can be made serviceable for mapping the scotoma itself by adding 12 or more graduated arms equally spaced, making 16 in all, provided with stimuli similar to those already described. Then when the fixation is obtained by the adjustment of the four stimuli designed for that purpose, the further mapping of the scotoma is accomplished by moving the remaining 12 until they are on the edges of the scotoma. Or if desired the four stimuli designed for the control of the fixation may not be used for that purpose at all. The physician may watch the patient's eye thru the telescope directing the fixation by means of the cross hairs, while all of the stimuli are moved into position on the edges of the blind area. This objective control of the fixation may also be used, both in mapping the scotoma and in taking the fields when a central scotoma is present.

If desired the patient's eye can be rendered more visible by reflecting the light from the lamp directly on to it. This is provided for by placing a small oblong mirror of specular metal on the lamp arm at such a position and angle that the light received from the lamp will be reflected on to the iris. This mirror is hinged to the lamp arm and can be turned back against it when not in use. The hinge is provided with a stop so that when the mirror is turned down it can not go beyond the position required to reflect the light on to the eye. The visibility of the eye in the field of the telescope is considerably increased also by excluding as far as possible scattered light. This was done by putting the objective lens well back in the tube, painting the inside of the tube a mat black and placing on the end of the tube nearer the eye a short tubular hood, which shields the opening from the direct rays from the lamp and admits only those reflected from the eye.

Another important need in a clinic perimeter is a method of giving the correct location and fixation to eyes suffering with high myopia. Eyes with myopia ranging from 8-20 diopters would have great difficulty in seeing a fixation object at a distance of 33 cm. Because of the grave pathologic changes which take place in the retina and choroid of eyes suffering from high myopia, particularly in the region of the macula and nerve head, it is of great importance to be able to use both the perimeter and the tangent screen to be described later, in the examination of eyes in the more advanced stages of myopia. Three provisions have been made for this. (1) The mirror may be mounted on a rod sufficiently long to permit of its location at any point in the line of sight between the perimeter arm and the eye. This rod may be inserted in the tubular axle on which the perimeter arm rotates. (2) A peep-sight device is provided similar in principle to the one already described, and so constructed that it may suffice as a fixation control for values of myopia ranging between 8 and 20 diopters. As shown in Fig. 4, this device has been so constructed that it can be used either for the normal or the myopic eye. That is, it is provided with two sets of fixation targets and viewing openings, each at their proper distance from the eye. Both sets are hinged to the narrow steel bar which serves as their support, so that either can be turned down out of the way when not in use. The diameter of the target for use with the normal eye is 8 mm.; the diameter of the viewing opening, 7 mm.; and the distance of the

opening from the target, 9 cm. The diameter of the target for use with the myopic eye is 8 mm.; its distance from the perimeter arm is 16 cm. The diameter of the viewing opening is 6 mm. and its distance from the target is 9.5 cm. (3) The perimeter arm may be illuminated with two intensities of light; one carrying the fields well towards the periphery of the retina, the other giving limits narrow enough to fall within the corrected field of the glasses which are worn or may be worn by the patient. This feature provides also for the correction of high astigmatisms, the presence of which make field taking annoying and uncertain as a diagnostic procedure. There are other advantages too of providing for the taking of fields at more than one intensity of illumination. (a) Because of the concentric arrangement of the fibers in the nerve trunk and their order of distribution in the retina, it may be of importance as a point of diagnosis to sample the responses of the retina at different degrees of excentricity. And (b) the low illumination fields are in general more sensitive to the influence of the pathologic factors which cause the fields to have different breadths. This is largely due to the fact that low illumination fields are narrow fields. That is, sensitivity falls off gradually near the center of the retina, therefore smaller changes of sensitivity are required near the center of the retina to expand or contract the field. It is probably also due in part to the change produced in the state of the retina's sensitivity at low illumination.

The control of fixation for the presbyopic eye also presents a problem to the perimetrist. The eye with a high degree of presbyopia would have considerable difficulty in seeing with the necessary clearness a fixation object at a distance of 33 cm. By the use of the mirror as fixation control this distance is extended to 66 cm. The satisfactory use of the mirror requires that the image of the eye be seen fairly clearly, and an eye without power of accommodation even if there is no hyperopia for far seeing is approximately 1.50 diopters out of focus for an object at a distance of 66 cm. When 1.50 diopters out of focus the eye can not see its image in the mirror with a satisfactory degree of clearness. However, the mirror can be used with a fair degree of satisfaction for lesser degrees of presbyopia.

We have three proposals to make for the control of fixation for the presbyopic eye. (1) The use of the mirror for the lesser degrees of presbyopia. (2) The use of an illumination sufficiently low to bring the color fields within the field of the correcting glasses. And (3) the use of a peep-sight or parallax fixation device (Figs. 3 and 4)[1] similar in principle to the one already described, with the target at a distance great enough to be seen with the necessary degree of clearness by the eye without power of accommodation. Sixty-six cm. has been chosen for this distance because (a) the target can be seen at 66 cm. with sufficient clearness to determine whether or not it is at the center of the viewing opening even tho the eye is as much as 1.50 diopters out of focus; and (b) a greater distance presents difficulty as a matter of feasibility of construction. The device is provided also with a lens, the distance of which from the target can be varied from its focal length to that which is needed to render the target clearly visible with 3 or more diopters of accommodation. (Three diopters are needed for the perimeter arm). With this lens at its focal length from the target, the rays of light are rendered parallel and the apparent or optical distance of the target is 6 meters. By suitably changing the distance of the lens from the target, the apparent distance of the target can be varied over a wide range. By means of this optical device, therefore, a clear image of the target can be formed on the retina of patients having all degrees of presbyopia with as little disturbance of focus for the perimeter arm for each degree of presbyopia as is possible for that amount of presbyopia. However, as we have already stated, it is quite possible to secure

1. As already stated, the device for control of fixation in high degrees of myopia is also shown in Fig. 3 in position for use. When using either, the other should of course be removed.

a good control of fixation without the use of the optical attachment.

The fixation device consists of a tube 17.5 cm. long and 8 mm. in diameter, and a light metal rod fastened at one end of the tube and supporting vertically at the other a small plate of hard sheet aluminum 3x3 cm., at the center of which is a disc 4 mm. in diameter. This disc and plate serves as the fixation target. To use this device as a control of fixation the telescope is removed from the tubular axle of the perimeter and the tube of the fixation device is inserted in the axle to a depth of 4.5 cm. To control the depth of this insertion and thus the distance of the target from the eye, the tube is provided with a stop or shoulder 4.5 cm. from the end inserted. The tubular axle and its extension thus form the opening thru which the fixation target is viewed, and when the eye is in position at the center of the perimeter system the target is seen to be centrally located in this opening. The target itself is painted black and the plate at the center of which it is mounted is painted in the same shade of gray as the remainder of the perimeter. The target receives its illumination from the lamp which illuminates the perimeter arm. An unobstructed passage of light from the lamp to the target is possible because of the distance of the target 33 cm. behind the perimeter arm. The lens which is used to vary the optical distance of the target from the eye is mounted in the end of the main tube, facing the target. This tube telescopes to the desired depth into a shorter tube, at the end of which on a short supporting rod is the target.

The steadiness of fixation is greatly influenced by the method of giving the stimulation. One of the serious objections to a moving stimulus is the difficulty of holding a steady fixation while the object to be observed is moving. The alternative procedure is the use of a stationary stimulus. That is, the stimulus is placed at the desired point on the perimeter arm and covered with the preexposure card. The observer takes his fixation and at a given signal the stimulus is exposed and recovered. By this method of giving the stimulation more time is consumed, but a much greater precision of result is possible. A compromise procedure is recommended. That is, the approximate location of the limit is determined with the moving stimulus, and the exact location with the stationary stimulus. By this compromise but very little more time is required, and there is no sacrifice of precision.

In order to provide for the mapping of the normal blind spot and for the quick detection and mapping of central and paracentral scotomata, it has been deemed advisable to add to the perimeter a tangent screen subtending a visual angle of 60 or more degrees. Provision is made so that this screen can be quickly and conveniently attached to the stimulus carriage and moved into position. The stimulus carriage and the tangent screen have at their exact center a circular opening equal in size to the cross section of the tubular aperture about which the perimeter arm rotates. Thus when the tangent screen is in position, *i. e.*, with its central point in the axis of rotation of the perimeter arm, the tubular opening in the perimeter is continued thru to the front surface of the tangent screen. This both provides for the exact adjustment of the tangent screen and permits of the convenient use with it of all of the fixation controls which we have described. Cards of white or black as may be desired, with the fields laid off on the tangent scale, are provided for the mapping of the area deficient in the light sense, and of grays of the brightness of the colors for mapping the color deficiencies. This is shown in Fig. 5. It is quite possible that the stimulus and preexposure cards used for the field taking and the larger backgrounds or cards for the tangent screen could be made of thin hard sheet aluminum coated with a flat enamel paint of white, black or grays of the brightness of the colors. If this were done, they could be kept clean by washing and the small paper disc of pigment color used as the stimulus for the field taking is all that would have to be renewed as the result of long periods of use. These paints can be bought in a flat black and a flat white. By using the two in the desired proportions the shades of gray desired may be obtained.

In our own work we have found it convenient to use the large screen just described for a quick survey of the field

for scotomata, and a smaller screen, similar to the one used to carry the colored stimulus in the field taking, for the actual detailed mapping of the scotomata and the normal blind spot. This screen was made considerably larger than the screens which serve as backgrounds for the colored stimulus in field taking in order that it might serve for the mapping of large scotomata and pathologically enlarged blind spots. It is mounted in a carriage of its own and is shaped to take the curvature of the perimeter arm. This screen is intended not as a substitute for the larger screen, but as a supplement in cases in which such a supplement is found to be convenient and desirable. This device has the following advantages over the large central tangent screen for the actual mapping of the blind areas. (1) It can be moved to any part of the field from the center out to 90° in any meridian and its center located at the center of the area to be mapped. When the screen is properly centered the mapping can be done as it is on any tangent screen. (2) Upon each screen is drawn 16 meridians running radially from the center of the screen. These meridians are finely graduated so that the limits of sensitivity in any meridian can be read off for the permanent record and transferred to properly planned maps at the convenience of the experimenter. (3) Blind areas are most easily and precisely mapped when the stimulus is made to follow lines radiating from the center of the area. Unless there are such guiding lines, it is difficult to pass from within out or from without in consistently when determining the limits of the blind area, or when checking up the location of a limit by a second or third determination. On a large fixed screen these lines would have to be drawn specially for each scotoma. (4) All of the evidence points toward the importance of mapping the blind areas with colored stimuli, particularly the Mariotte spot. It is highly important that the determinations for the different colors be made on backgrounds of the same brightness as the colors, as will be shown by blind spot studies to be published later. It is much more feasible to arrange for this in case of the smaller movable fields than in case of a large fixed field. When the background for the smaller field is laid off in graduated radial lines, it can serve for the mapping of many blind spots and scotoma before it need be replaced. In case of a large fixed screen, this superior adaptability and long service would not be possible. (5) With the movable smaller field, it is more nearly possible to map all blind areas under the conditions of equal illumination which obtains in the perimetry of the color fields, than it is in the use of the large fixed screen. In the latter case the illumination at which the mapping is done in one part of the field, may be quite appreciably different from that at which it is done in another part, of the field. The control of illumination while not so important for mapping the blind areas to the light sense stimuli, is very important in the mapping of the blind areas to colors.

With the controls provided in the perimeter recommended, a careful worker can without difficulty reproduce the limits of sensitivity within 1 or 2 degrees.

CONCERNING CONGENITAL COLOBOMA OF THE LENS.

WALTER BAER WEILDER, M.D.

NEW YORK CITY.

Our present knowledge regarding the condition is cited and a case seen by the author is reported in detail.

Coloboma of the lens is extremely rare, but coloboma of the lens associated with coloboma of the iris or the choroid is a much more frequent occurrence. There is no doubt that this form of congenital defect often escapes detection, because it may exist without any great reduction of vision being present. The case of coloboma of the lens reported in this paper probably never would have been detected except for the atropin used for the refraction.

Kampffer in 1899 was able to collect thirty-two cases of coloboma of the lens,

and I have been able to find the report of only one more case. Coloboma of the lens is a congenital defect involving the edge of the lens with loss of substance, the lens being otherwise normal. There may be one or more of these indentations, and a very interesting case of double coloboma is reported by Gunn (Trans. Opth. Soc. of the United Kingdom, XXIV, 1904, p. 86).

There is no complete classification which includes all the different types of colobomatous defects of the lens.

In regard to the position and the location of the coloboma, there have been reported cases of coloboma in every portion of the lens; the rarest being those where the defect is directly up, and next those directly in.

The absence of any coloboma of the choroid and the iris and the microcornea makes my own case more unique in its rarity.

In none of the cases previously reported have I been able to find coloboma of the lens associated with microcornea. The cornea of the left eye was smaller than that of the right eye and its long axis was not at 180 degrees but at 60 degrees. The microcornea was probably due to some interference in the proliferation of the mesodermal layer.

The explanation of the formation of coloboma of the lens is still a subject of dispute. There have been many theories offered, and the two that seem to be most probable are those offered by Heyl and Hess. Heyl believes that these colobomata of the lens are due to insufficient or arrested development of some of the vessels of the vascular lens capsule, and this causes an arrest in the development of the lens. Hess takes just the opposite view and claims that these colobomata of the lens are due to a pressure on the lens by some portion of the vascular capsule, which has not undergone regressive changes and absorption at the usual time.

It would seem quite possible that both of these theories might explain different types of coloboma of the lens. Depending on the location of the defect and whether there is a coloboma of the iris, lens and choroid, the theory advanced for the coloboma of the choroid and iris explains the presence of a coloboma of the lens at such times.

In none of the cases reported has there been any retention of the pupillary membrane or the arteria hyaloidea, and if the Hess theory be true, we would expect such defects ought to sometimes exist coincident with the coloboma of the lens.

In many of the cases that have been reported, the coloboma of the lens is accompanied with ectopia. This partial dislocation of the lens may be due to the absence of the suspensory ligament, thus permitting the lens to be pulled out of its normal position.

The persistence of the fibers of the suspensory ligament of the lens cannot be interpreted as having any significance in determining the etiologic factor in the development of coloboma of the lens.

The refraction of the eyes with coloboma of the lens has generally been myopic with varying degrees of astigmatism. In those cases where the degree of myopia and astigmatism has been high, the lens has usually been found to be partially dislocated. In my case there was myopia with hypermetropic astigmatism, and it was possible to improve the visual acuity from 20/70 to 20/60. The amblyopia was due perhaps to an underdevelopment of the choroid and retina.

Report of Case: Miss H. F., aet. 10, born of Hebrew parentage at term, one year and a half after previous child. No history of miscarriages or any form of congenital defects in the immediate family. Child always held her school books close to her eyes and the school nurse, on account of the poor vision in the left eye, requested an examination of her eyes for glasses.

Patient was first seen at the Manhattan Eye, Ear, Nose and Throat Hospital, and an examination revealed the following: Both pupils 3.5 millimeters, react to light, accommodation and convergence and the tension is normal. R. vision 20/20, L. vision 20/70. The corneal measurements of the right eye was 11 by 12 millimeters, whereas in the left eye it was 10 by 9 millimeters, placed at an axis of 60 degrees.

Oblique Illumination: The iris stroma does not show the same degree of differential development as in the right eye. There is almost complete absence of the pits and ridges on the nasal side of the iris. The pupillary edge is very

slightly notched, with a slight thinning of the retinal pigment layer. The iris stroma layer is also slightly thinner.

Ophthalmoscopic Examination: R. media clear; disc is oval, 10 by 12 millimeters, long axis, 105 degrees, scleral ring all around, eccentric excavations out, vessels long axis 120°. L. media clear, disc oval, 10 by 12 millimeters, long axis 120 degrees, scleral ring all around, broad

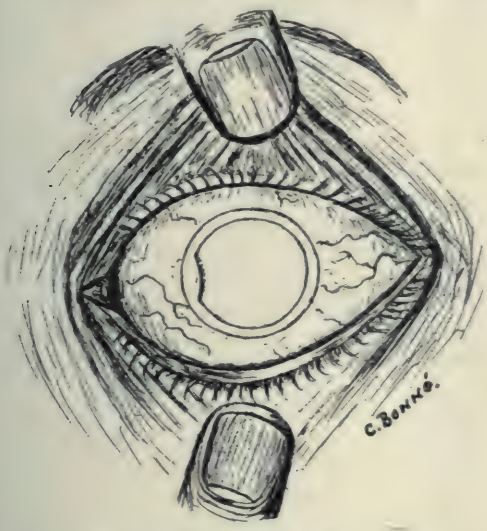

Fig. 1.—Iris is absent in this drawing, showing the dark edge of the coloboma.

choroidal ring up, in and down. There is a fairly large sized choroidal pigment crescent down and in, and this pigment extends from the margin of the disc into the fundus for a distance of 5 millimeters.

There is absolutely no defect of the choroid seen that could be considered colobomatous in nature. The retina and choroid are normal from the edge of the disc and as far out as can be seen. The margin of the inner half of the disc is rather difficult to see on account of the parallactic motions, but with an electric ophthalmoscope one is able to make out the different levels very well. The parallactic movement of the vessels is due to our looking thru the different thicknesses of the crystalline lens, and this is especially noticed as we approach the inner margin of the disc.

At the nasal side of the lens, about 5 millimeters from the center, a series of dark concave shadows are seen, and these increase in density as you approach the inner edge of the lens. There is a complete notching of the nasal side of the lens at the horizontal axis, which appears to be about 3 or 4 millimeters deep. In the clear space the thin fibrillae of the suspensory ligament may be seen, and these are best seen with plus 16. They may also be seen with oblique illumination. The inner edge of the lens is

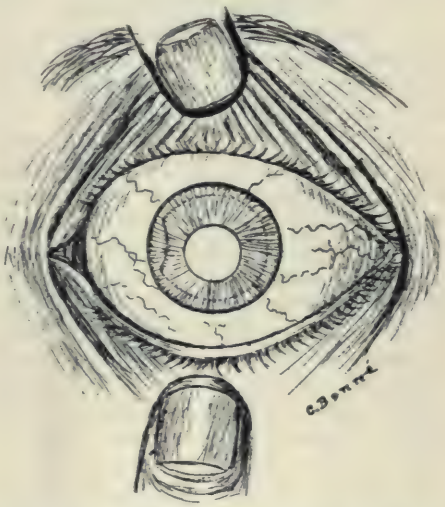

Fig. 2.—Iris is present in this drawing, showing how the coloboma appeared when seen with the ophthalmoscope.

smooth and regular and the rest of the lens is normal. Refraction, atropin, R. —1 sp. = plus 0.75 cyl. axis 180 degrees =20/15. L.—2.50 sp. plus = 2 cyl. axis 180 degrees =20/60.

This case has been under observation for over a period of ten years, and the refraction of the eye has changed from myopia and hypermetropic astigmatism to that of myopia and myopic astigmatism. There has been a gradual decrease of the vision, so that at my last examination of the eyes, with the following correction, L.—5 sph. ⊃—6.00 cyl., vision was 20/100.

The vision is greatly reduced in all of the cases that have been reported and cannot as a rule be improved with lenses. Heredity and consanguinity do not seem to play an active part in the formation of coloboma of the lens. The defect is usually unilateral, having no special predilection for sex or race.

NOTES, CASES AND INSTRUMENTS

DACRYOCYSTITIS CURED BY AUTOGENOUS VACCINE.

WALTER N. SHARP, M.D.

INDIANAPOLIS, IND.

On Mch. 26, 1920, O. E. C. came to my office with the following history: While cutting heavy cardboard with a power-cutting machine, six weeks previous, a piece of the cardboard, forcibly driven, struck the nose piece of his spectacles, driving the angle of the bridge into the soft parts of the nose, below the left inner canthus.

Soon after this an abscess formed, which was incised by his local physician. This soon healed, but the sac was partly filled with pus which could be expressed thru the lower punctum.

For a month following, I passed Bowman's probes, first No. 3, then No. 4 twice a week, followed by irrigation of the sac with argyrol and boric acid solutions. I could not pass a probe larger than a No. 4, as stricture had formed at the point of the former incision.

As the case was an industrial one, and as the result of treatment was thus far unsatisfactory, I extirpated the sac, which was quite free at the superior portion, but strongly adherent at the inlet of the duct, at which point I curetted as thoroly as possible, supposedly, all the mucous membrane or remnants of the sac.

The wound healed nicely, but a week later a fluctuating swelling occurred at this point which I incised, and from which pus flowed. A sinus was formed thru which I could pass a probe to the depth of 12 mm. Pus continued to flow thru this despite every therapeutic measure I had read or thought of. I finally made two cultures from the bottom of the sinus, from which a vaccine was made. Two injections were made at intervals of three days. After the first injection, marked improvement was shown. After the second injection the sinus healed, and now after two years, he has had no further trouble. The organism was the staphylococcus. I do not know whether this treatment has before been tried in such cases as the above; but whether one believes in the therapeutic value of vaccines or not, the measure is well worth trying.

ENCEPHALOPATHY WITH OCULAR COMPLICATIONS PROBABLY DUE TO LEAD POISONING.

ALBERT C. SAUTTER, M.D.

PHILADELPHIA, PA.

W. G., single, age 23 years, had been employed in a storage battery plant for about a year, his work consisting in scraping lead plates, no gloves being worn. With the exception of an attack of appendicitis in March 1921, he had been in good health until ten days prior to admission to the Lankenau Hospital, when he was taken with headache, nausea, constipation and general malaise, which compelled him to stop work and seek the advice of the Company's doctor. His symptoms remained about the same until the tenth day, when he was seized with vertigo and inability to stand; he retained consciousness but could not talk rationally. The family physician was now consulted, who referred him to the Hospital.

Hospital Notes. On admission Oct. 22, '21, patient was restless, respirations labored; he seemed weak and moderately anemic. Lungs were negative. Heart examination disclosed a soft, blowing, systolic murmur at the apex, not transmitted. There was no wrist drop and reflexes were normally active.

Ears and nose negative. No blue line on gums, teeth in poor condition.

Pupils showed no abnormalities, but the right eye deviated towards the nasal side. There was no ptosis.

While in the hospital, patient complained of headache, diplopia and drowsiness; at times however he was restless and confused mentally. Three days after admission, he had more or less generalized convulsions accompanied by vomiting, unquestionably pro-

jectile in type. The temperature kept within normal limits.

The case suggested either lead encephalopathy or lethargic encephalitis. An ophthalmoscopic examination made on October 24 by Dr. W. T. Shoemaker disclosed a low degree of optic neuritis in each eye, with an old patch of choroiditis in the macular region of the right eye. Pupils were small, equal and the reactions normal. There was a partial paralysis of the right external rectus.

Urine examination on the day of admission showed a faint trace of albumin, a few hyalin casts, no sugar, urea 1.2%, no lead present. Subsequent tests showed no albumin or casts.

Blood examination—hemoglobin 64%, erythrocytes 3,940,000, white blood cells 8,750, polymorph. neutrophiles 77%, lymphocytes 15%, large mononuclear 6%, transit. 2%; stippling present, polychromatophilia ++. Wassermann negative.

Under the usual treatment for lead poisoning, patient gradually improved and he was discharged from the hospital on November 17th and referred to the Eye Dispensary, where he first came under the writer's observation.

At this time his general condition was good but there was still a paresis of the right external rectus, the deviation of the right eye being about 20 degrees. Vision O.D. equalled 6/30, O.S. 6/9. Ophthalmascopic examination revealed a high grade neuroretinitis in each eye, with many hemorrhages and exudations, and with a large pigmented patch of choroiditis near the macular region of the right eye previously noted and smaller choroidal lesions in the nasal fundus of the left eye. (According to the patient the right eye had always been defective.)

A field examination showed marked concentric contraction for form and colors, with defects corresponding to the choroidal lesions. A von Pirquet done at this time was negative, and X-ray showed the pituitary fossa a trifle more capacious than usual but without signs of erosion.

Patient was placed on Potass. Iod. and during the ensuing weeks the nerve inflammation gradually subsided, and there was absorption of the exudation and hemorrhages, the nerve heads assuming a greyish pink color with somewhat blurred outlines, and the retinal vessels becoming reduced in size.

December 9 there was no evidence of an external rectus palsy; a field test showed only a moderate contraction of the form and color fields. January 18, Vision O.D. 6/30; O.S. 6/7, with still more favorable perimetric findings. Eyegrounds with the exception of reduced calibre of the vessels and pigmented lesions appeared fairly normal.

The diagnosis of probable lead encephalopathy was based on the patient's occupation, favorable response to treatment for lead poisoning, on pronounced polychromatophilia, marked neuroretinal changes (uncommon in lethargic encephalitis), associated with negative Wassermann and v. Pirquet findings. These findings, even in the absence of a blue line on the gums and lead in the urine, in the opinion of members of the Staff and the writer, strongly favored a diagnosis of lead intoxication. An attack of appendicitis with appendectomy performed in the same hospital nine months previously (after he had been working in the factory five months) raises the question as to whether this could have been a case of lead colic wrongly diagnosed appendicitis. Patient never had had a previous attack of appendicitis; on the other hand, after the operation no further abdominal symptoms were noted. Pathologic examination of the appendix showed a subacute catarrhal inflammation of the appendix, hardly sufficient evidence to positively exclude lead colic as a possible cause of his abdominal symptoms.

The infrequency of eye symptoms due to lead poisoning is the reason for publishing the history of this case. In 1217 cases of lead poisoning, Tanquerel des Planches found only 12 cases of amblyopia. Uhthoff's study of 204 cases of retrobulbar neuritis among 30,000 patients showed 138 of toxic origin, but only one due to lead. De Schweinitz's review of 12,000 eye cases at the Philadelphia and Jefferson Hos-

pitals during a period of five years showed only three cases of optic nerve and retinal changes due to lead, and of these two were doubtful. The same writer also states that chronic lead poisoning is a well known cause of paralysis of the external ocular muscles, the abducens, according to Schroeder, being most frequently affected, a condition perhaps similar to the palsies of the extensor muscles of the extremities.

MONOCULAR TRACHOMA.

HAYWARD G. THOMAS, M.D., F.A.C.S., and FRANK S. BAXTER, M.D.
OAKLAND, CALIFORNIA.

In the voluminous literature on trachoma, scarcely any mention of the condition being limited to one eye can be found. Würdemann, in the November number, 1921, of the AMERICAN JOURNAL OF OPHTHALMOLOGY, cites five cases, three of which were first reported in 1896 in the "Annales d'Oculistique." In the past two years two cases have come under our observation with unmistakable monocular trachoma, both having typical granulations on the tarsal conjunctiva and fornix, marked pannus, and one ulceration of the cornea.

CASE 1.—A. J. C., American, age 43. First seen December 24, 1920. For past two months has been troubled with watery discharge from right eye, photophobia and diminished vision. Examination showed typical trachomatous granulations covering upper tarsal conjunctiva and cul de sac. Lower conjunctiva swollen, but no granulations. Pannus covered the upper half of cornea. Usual treatment with copper sulphat and silver nitrat. The patient has been very negligent in his treatments, has returned every two or three months with an acute exacerbation, and at the last return showed a large corneal ulceration. Usual treatment with prompt improvement. The left eye has always been normal. We feel that in such a case, resection of the tarsal cartilage is the only hope for a permanent result.

CASE 2.—Mrs. H. W., Japanese, age 26. First consulted us January 20, 1922. Has had trouble with left eye for six months. Examination showed a condition similar to Case 1—a typical monocular trachoma limited to the left eye. Upper cul de sac covered with granulations. Mild pannus covering upper third of cornea. Copper sulphat stick and yellow oxid ointment treatment. The pannus has practically cleared and the granulations have about disappeared from the upper fornix.

SELF EXPRESSION OF LENS.

KARL C. WOLD, M.D.
ST. PAUL, MINN.

Altho this is not an unusual occurrence, I would like to report a case in which the lens was expressed by patient. There was no indication of orbicular spasm, and except for a rather narrow palpebral fissure, the appearance was normal.

Iridectomy was performed in the usual manner preliminary to extraction of cataract (senile). Nothing unusual developed and the patient was put to bed. On the second day, he complained of pain in the operated eye. The bandage was carefully removed, and on opening lids, the whole lens was found in the lower cul de sac. Despite all precautions and treatment, an iridocyclitis developed and light perception was the best vision obtainable.

This necessarily brings up the question of routine injection of the orbicularis muscle. It is a very important one for lessening the dangers of cataract operation. The effect of novocain and apothesin has proven efficient during operation, but at best lasts only a few hours.

The suggestion of Col. Smith is a good one, that when a drug is discovered which will paralyze the orbicularis for several days, the worry of vitreous escape and prolapse of iris will be at a minimum. Used routinely it would prevent just such an accident as occurred in my patient.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLORADO OPHTHALMOLOGICAL SOCIETY.

MARCH 18, 1922.

DR. J. M. SHIELDS, Presiding.

Lens Opacities Perhaps From Uveitis.

F. R. SPENCER and C. L. LA RUE, Boulder, presented a woman, aged forty-five years, who had come on February 1, 1922, complaining that the eyes had been aching for one month and that she felt she might be able to get better glasses. With correction the vision was R. 6/4 minus 1, L. 6/5 plus 2, but the refractive measurement was not altogether definite. There were in each eye small floaters in the vitreous and peripheral vacuoles in the equatorial plane of the lens. General physical examination was entirely negative, with the exception of a slight pyorrhea, which was promptly attended to, and a probable tonsillar infection. When the tonsils were removed, the right one was found to contain a small central abscess. One month after tonsillectomy, the fundus was less hazy and there were fewer floaters, but there seemed to be an increase in the lenticular changes. Were these likely to progress, or were they probably of long standing and relatively unimportant?

Discussion.—MELVILLE BLACK, Denver. I regard this case as one of low-grade uveitis. In a woman of forty-five years, we should not expect such changes without some disturbance of nutrition. The ciliary body presides over the nutrition of the vitreous and lens.

E. M. MARBOURG, Colorado Springs, had recently had a case of serous iritis in a patient suffering from dermatomyositis due to eating lamb; in which case, after other remedies had failed to modify the situation, injections of sterilized milk had been given under the skin of the arm with prompt benefit.

Steel Thru Lens Without Opacity.

F. R. SPENCER and C. L. LA RUE, Boulder, presented a man, aged forty-two years, whose left eye had on February 27, 1922, been struck by a piece of steel, probably from a steel hammer. The vision of the injured eye was slightly below normal. Examination of the eye revealed a small perforation of the iris near the pupillary margin upward and inward, and a corresponding wound in the cornea. After dilatation of the pupil the path of foreign body thru the lens at a point corresponding with the wounds in the cornea and iris was clearly visible; and on examination of the vitreous at a very acute angle, a minute foreign body was seen below and apparently in close proximity to the posterior lens capsule. This was verified by X-ray examination. On account of discontinuance of the direct current in Boulder, the patient was referred to Dr. Finnoff, who extracted the foreign body with the hand magnet. The dimensions of the fragment were 0.5 by 1.5 by 1.5 mm. A remarkable fact about the case was that more than two weeks after the accident no opacity had developed in the crystalline lens beyond the bare indication of the path of the foreign body. With very slight correction the vision was 6/4.

Discussion.—W. C. FINNOFF, Denver. The course of the foreign body thru the lens was more distinctly visible at first than now. After having the X-ray localization, we came to the conclusion that the fragment was resting on the ciliary body in the region of the ciliary processes. So we decided to remove it thru an incision near the ora serrata. On account of the close proximity of the fragment, an incision of only a millimeter and a half was made. After the tip of the magnet had been presented at the operative wound and the current turned on twice without result, the fragment was brought out by inserting a small periosteotome and applying the magnet to it, altho even then it was necessary to apply the tip of the magnet once more to the operative wound in order to coax the foreign body thru the wound.

J. A. McCaw, Denver, who had been present at the operation, remarked that to him the smallness of the incision was the exceptional thing about the case.

Melville Black, Denver. The nearest thing to this that I have seen as regards the absence of change in the lens was in a case in which the foreign body stayed about three months before any marked lens change developed.

W. C. Finnoff had operated some months ago on a dislocated lens, the capsule of which he had accidently incised without any opacity resulting.

W. H. Crisp, Denver, suggested that the peripheral site of the passage thru the lens had an important bearing on the amount of disturbance produced; and referred to two cases recently seen, in one of which with a peripheral lens wound no general opacity of the lens was noticeable after three years, while in the other case, in which only a few days before examination a small piece of steel had passed fairly near to the center of the lens, there was a diffused posterior cortical opacity similar to that sometimes seen after contusion.

Retinal Hemorrhage of Uncertain Etiology.

F. R. Spencer and C. L. La Rue, Boulder, presented a woman, aged twenty-four years, who had been refracted in 1917 and 1920, at both of which dates the fundi had been normal; and who had returned on October 21, 1921, on account of gradual loss of vision in the right eye during the previous four months. The corrected vision was then R. 6/20, L. 6/5 minus 2. The right vitreous was found full of large floaters and generally hazy, and the fundus details indistinct. A presumptive diagnosis of tuberculosis of the retinal vessels was made. Physical examination by an internist was entirely negative. A dose of 1 mg. of old tuberculin gave a very severe local and constitutional reaction in twenty-four hours, but no apparent change in the eye condition outside of redness of the conjunctiva. The teeth, nose, and tonsils were negative. The patient was therefore kept under tuberculin. On March 11 the vision of the right eye had fallen to 3/60, and a few small floaters had appeared in the left vitreous, altho vision of this eye was as before. It was not possible to make out definitely any change in the retinal vessels of either eye.

Discussion.—Melville Black, Denver, leaned toward a tuberculous etiology, and thought it proper to go on with tuberculin injections, using sufficiently small doses to keep under the reaction point.

W. H. Crisp, Denver, thought there was an appearance which suggested a retinitis proliferans behind the haze near the macular region.

W. C. Finnoff, Denver, thought that the whitish area referred to by Dr. Crisp was pretty far forward, and that absence of change in the neighboring bloodvessels was against the presence of retinitis proliferans. The doses of tuberculin given by the internist for diagnostic purposes were excessive. Such large doses of tuberculin might be given in other types of ocular tuberculosis, but not where tuberculosis of the retinal vessels was suspected. Dr. Finnoff had seen fairly recently two cases in which excessive doses of tuberculin given for diagnostic purposes had produced retinal hemorrhage which ruined the eye. For disease in this location, the initial diagnostic dose should be 1/500,000 mg., subsequent doses being doubled from day to day.

D. H. Coover, Denver. Eighteen months ago I sent back a young man from Salt Lake City whose vision was greatly reduced, and in whom I made a diagnosis of retinal tuberculosis, with instructions that an initial dose of 1/500,000 mg. was to be used. The case improved very rapidly, and for some reason turberculin was discontinued. His physician then gave a large dose of tuberculin, with the result that the patient returned to me with hemorrhages into the vitreous, and at the last report I got he had never recovered his vision.

Acute Cataract at Ten Years of Age.

W. C. and W. M. Bane, Denver, presented a boy, aged ten years, whose right cornea had in August, 1920, been slight-

ly injured by a piece of weed, but had promptly healed. In March, 1921, he had returned on account of a spontaneous dilatation of the right pupil, which measured 7 mm. as compared with 2 3/4 mm. for the left. At that time the right pupil reacted to light and accommodation. The boy had again returned on January 23, 1922, complaining that for about two months the vision of the right eye had been blurred. The lens was found to be cataractous, the anterior chamber shallow, the pupil slightly larger than the left. The right pupil was relatively fixed by posterior synechiae. The tension of the eye was normal. The condition of the eye had changed very little during the past two months, except that under atropin a wider dilatation of the pupil had been obtained.

Discussion.—MELVILLE BLACK, Denver, would keep the case under observation for several years before taking further action.

Peripheral Iridotomy for Glaucoma.

MELVILLE BLACK, Denver, presented one case and reported a second in both of which Curran's peripheral iridotomy operation had been done for glaucoma. The first patient was a woman of forty-two years who gave a history of several attacks of iritis in the right eye. According to an optician, she had had 15/20 vision in this eye three months previously, but since then the vision had been practically lost. When first seen by Dr. Black, on August 18, 1921, the tension of the right eye was 66 mm., and there was a very pronounced glaucomatous cup. In the course of two days, eserin lowered the tension to 14 mm., and reduced the diameter of the pupil from 5 to 3 mm. The patient unfortunately proved very intolerant of eserin, and also of pilocarpin, which was later given in place of the eserin. She had recently returned with the eye extremely red and irritable, and the tension 24 mm. Four days before the meeting Curran's operation had been done, and no eserin or pilocarpin had been used since, and the tension was now about 28 mm. The second case was in a woman of forty years. The tension of the affected eye had been 60 mm. and the cornea had been steamy and the eye very red, altho there was not much pain. The patient came to the clinic suffering from a subacute exacerbation of the chronic condition. Prior to the operation the patient had been under eserin, which was discontinued at the time of operation. The eye was doing well the first day after the operation, but on the second day the tension was again very high, and the cornea had become steamy again. . Resumption of eserin promptly controlled the tension. Eserin was again stopped four days after the operation, and the tension had stayed down ever since, being 11 mm. at the last report, about seven days after the operation.

Copper in Vitreous.

MELVILLE BLACK, Denver, presented a blacksmith, aged thirty-two years, who while getting a shovelful of wood coals out of a stove had been injured by an explosion of something in the shovel, probably a dynamite cap. The vision of the eye had been disturbed from the time of the injury. Examination next day revealed a bloodshot area over the region of the internal rectus muscle, the ophthalmoscope showed a number of large shreds in the vitreous, and in the nasal side of the vitreous was an opacity shaped like an Indian club, and having somewhat the appearance of metal. Central vision was 20/20, but a very large sector of the field was lost above. Radiography showed a small metallic foreign body in the lower part of the vitreous. A test with the magnet indicated that the foreign body was not magnetic. The vision had gradually fallen until it was now reduced to finger movements in the lower part of the field. With the ophthalmoscope it was still possible to see the upper half of the fundus quite clearly, but the lower half was entirely obscured. Externally the eye appeared perfectly normal, and there was no change in the iris or in the size or reaction of the pupil. The vitreous no doubt contained a piece of

copper or brass. It would probably be well for the present to leave the eye alone.

Syphilitic Neuroretinitis.

W. C. FINNOFF, Denver, presented a man, aged twenty-nine years, with a positive history of syphilis, treatment with salvarsan and mercury inunction having been begun with the appearance of the secondaries in April, 1921. On June 10, 1921, the vision had become hazy in both eyes, fine floaters being noted. The vision at that time was R. 0.35, L. 0.7, and ophthalmoscopic examination showed bilateral neuroretinitis with dust like opacities in the vitreous. Mercury and iodids were pushed to the limit of toleration but without apparent benefit, and baths and constitutional treatment at Hot Springs, Arkansas, from November, 1921, to February, 1922, were equally ineffective. At the time of presentation the vision was R. 0.2, L. 0.5. The nasal sinuses and teeth were negative, and no other possible focus of infection had been found.

Discussion.—MELVILLE BLACK, Denver, thought that before the advent of salvarsan there had not been so many of these obstinate recurring syphilitic eye conditions.

C. L. LARUE, Boulder, thought that salvarsan itself was really responsible for some of the severe eye troubles which occurred after its administration for syphilis.

W. H. CRISP, Denver, pointed out that it had been repeatedly demonstrated that optic nerve and other eye disturbances occurring after the use of salvarsan were cured by the administration of further doses of the same remedy, indicating that the disturbances were due to the underlying syphilis and not to a toxic action of the drug.

Retinal Detachment.

J. M. SHIELDS, Denver, presented a man aged thirty-two years who dated a falling off in the vision of the left eye from one month after an attack of mumps, complicated by facial erysipelas. He had been first seen by Dr. Shields in April, 1920, when the vision was R. 5/5, L. 5/30. There was at that time some elevation of the lower half of the left retina, which could be clearly seen with a plus 6 D. sphere, while the upper part of the fundus could be best seen with a minus 2 D. sphere. At the time of showing the patient, the anterior portion of the lower half of the retina was clearly seen with a plus 11 D. sphere. The patient said he had had some pain in the eye, but the tension had never been found above normal. The elevated retina did not flutter with movements of the eyeball. The vision of the affected eye had fallen to seeing movements in the lower field. A diagnosis or subretinal newgrowth seemed to be probable.

Discussion.—W. C. BANE, Denver, suggested keeping the eye under observation for two or three months more before deciding as to enucleation. Dr. Bane hardly believed that there was a newgrowth beneath the detachment.

H. R. STILWILL, Denver. Is there not a method of diagnosis applicable to such cases, by the insertion of a needle thru the sclera beneath the detachment, to determine by touch or ophthalmoscopic observation whether or not the needle moves freely within the eye?

W. C. FINNOFF, Denver. If by such a test the presence of a solid mass were demonstrated, the surgeon should be prepared to remove the eye immediately, because of the danger that insertion of the needle might stir sarcoma cells into the circulation. The rather regular detachment without hills and valleys, and the gradual development of the disturbance, favor the presence of a subretinal growth.

W. H. CRISP, Denver, was rather disposed to feel, especially in view of the greatly reduced vision, that if this were his own eye he would have it taken out.

WM. H. CRISP,
Secretary.

ROYAL SOCIETY OF MEDICINE LONDON.

Section of Ophthalmology.

FRIDAY, MARCH 10TH, 1922.

DR. JAMES TAYLOR, President, in the Chair.

Circinate Retinitis, with Excavation of Disc.

DR. RAYNER BATTEN showed a woman with a large, white, circular patch on the nasal side of the disc, somewhat resembling retinitis carcinata. She also had a very deep glaucomatous disc, the disc cupping having been observed to increase while she was under observation. In 1916 the vision in the right eye was 6/6 and tension, pupil and optic disc were normal. In April, 1916, she complained that for six days she had had pain; and the fundus could not then be seen, owing to vitreous opacities. In July, 1921, the vitreous had cleared, and then the present condition of the fundus was seen. At no time was the tension of the eye found above normal. Therefore he considered that cupping of the disc was due to something other than an increased tension.

Discussion.—Mr. Harrison Butler thought this might be a case of cavernous atrophy of the optic disc.

Bilateral Enlargement of Lacrimal Glands.

MR. THORPE showed a case of this condition in a girl, who a month ago came complaining that the enlargement had lasted five weeks. There had been no salivary gland enlargement. It commenced on the right side, and in a few days had extended to the left. There was also conjunctival chemosis, and the eyelids were closed. There was now a tendency to improve. In a blood count, the red cells were found to be normal, the whites were 14,320, hemoglobin 75%, polymorphs. 43%, eosinophiles 18%, lymphocytes 38%, mononuclears 1%; there were no mast cells. The color index was 0.85. Tho the eosinophilia suggested filaria loa, no nematode worm was discovered. There was no reason to suspect neoplasm, and his view was that the condition was tuberculous.

Discussion.—Mr. Leslie Paton drew attention to the report of a case of double enlargement of lacrimal glands in the February issue of THE AMERICAN JOURNAL OF OPHTHALMOLOGY. He described a case of his own, in a woman of about 40, for whom, as she was importunate, he operated and removed the glands, finding they were the seat of a simple inflammation.

The PRESIDENT spoke of a remarkable enlargement of parotid, salivary and lacrimal glands following the taking of only 20 grs. of iodid of potassium; the swelling of them quite closed the eyes. After a time a further trial of iodid was made, starting with only 5 grs. three times daily; but the trouble following the second dose was even greater.

Specific Degeneration of Retina.

MR. LINDSAY RAE showed a boy who, having been blind a year, since he was 6, had latterly been able to perceive bright light. The Wassermann was definitely positive. He proposed to give salvarsan intravenously.

Choroiditis.

MR. RAE also showed, for diagnosis, a case of either retinitis or choroiditis. With the best correction the vision could not be improved beyond 6/12. She had ten septic teeth removed.

Discussion.—MR. MALCOLM HEPBURN drew attention to a large linear vitreous opacity, which might be a vitreous hemorrhage, with some fibrous degeneration over the retina. He regarded it as a choroidal condition.

Anomaly of Retinal Arteries.

MR. GRIMSDALE showed a patient with loops of vessels, which he considered had a connection with the hyaloid artery and the lower branch of the arteria centralis retinae. A brother was similarly affected.

Colored Vision.

MR. P. C. DOYNE, in a paper on this subject, said a colored vision was associated with a variety of conditions, physical and pathologic, the most generally familiar form being, perhaps, that following exposure to snow, or which may appear to those who have had cataractous lenses removed. Mr. Work Dodd described, in volume

XIX of the Transactions of the Ophthalmological Society, a state of green vision in a man the subject of tabes dorsalis, and in the next volume he presented records of 13 cases of the condition; 3 of them had lead poisoning, 3 were myopic, 1 had detachment of retina, 1 had tabes, in 3 there was active choroiditis, 2 had migrain, 1 had wound of the cornea with prolapse of iris. In one no details were available. Mr. Treacher Collins had told the speaker, that colored vision might be associated with (1) changes in the visual media of the eye, (2) after images, (3) might depend on the position in which light impinges on the eye, (4) pathologic retinal and nerve irritation, (5) cortical disturbances, (6) functional.

During the last few months, Mr. Doyne had collected 11 cases of various forms of colored vision, and of these he gave the leading features as described by the patients. These may be summarized as follows:

Case 1. Male, aet. 65; vision 6/6 in each eye (with correction). For a few months had noticed a dark red area in the center of the field of vision when awaking in the morning, and, to a less extent, at dusk. This cloud lasted 20 minutes, then faded away; he could see thru the cloud. There was some sclerosis of the choroidal vessels, and in the macular area a clearly defined zone of colloid body formation.

Case 2. Female, aet. 68. Occasionally had blood red clouds in front of the eyes, and sometimes saw an appearance as of blood on her handkerchief. Had had the condition three years, but more markedly during the last 3 months. With correction, vision was respectively 6/12 and 6/18; a few peripheral striae were in each lens. At the macula there was a condition like that in Case 1.

Case 3. Female, aged 41. Had ptosis of the right eye, and some scattered lens opacities in each eye; discs were pale and the Wassermann was positive. Diplopia was complained of, but ocular palsy could not be detected. No lesion of the central nervous system could be discovered. She saw a red ring, inside which were various colors, i. e., blue, green, yellow.

Case 4. Female, aged 45. The right eye was blind. With a minus 16 in front of the left eye she could count fingers, and in this eye was a big detachment of retina, up and out. One day on going out on to the hospital verandah, 'everything went red,' and this persisted 45 minutes after she returned into the shade.

Case 5. Female, aged 60; a case of erythropsia following upon extraction with iridectomy, the symptoms having appeared three months after the operation.

Case 6. Female, aged 37, who had marked bilateral optic atrophy, dilated pupils, a strongly positive Wassermann, and some dulling to deep and superficial pain in the legs. She had bare perception of light. A month ago, suddenly, after dinner, everything became a brilliant red, as if a red curtain had been drawn before the eyes. Ten days later she reported that it had disappeared, and given place to a grey cloud.

Case 7. Female, aet. 18, with 5 D. myopia; with this corrected she read 6/12 with right and left. For two months she had been seeing colors flash past her eyes when moving her head. Mostly purple was seen, but sometimes black, and occasionally other colors. This type Mr. Doyne believed to be sometimes found in cases of retinitis pigmentosa. This patient's visual fields were quite full; there was no night blindness, and the fundi did not suggest that disease.

Case 8. Male, aet. 23. In the macular area of the right eye there was a grey change, dragging upon the retina and producing radiating folds in it. In the retina peripherally there was much glistening from the interior limiting membrane, and there were dots above and below the disc. Both daylight and bright electric lights troubled him. When tired, he noticed a purple cloud in front of the right eye, and it had a bright yellow margin; after lasting some time, the cloud broke up into smaller ones and then disappeared.

Whatever color the cloud started with, it always reverted to purple.

CASE 9. Female, aged 26, who for six months had had a cloud in front of the right eye; the left was blind. The cloud appeared suddenly, was first red, then green, then black. It appeared only in the daytime. The right eye appeared normal.

CASE 10. Male, aged 45, a well marked case of tabes, with optic atrophy. Four months ago he noticed a red mist in front of his sight, and in time it became a darker red.

CASE 11. Male, aged 38, whose left eye was blind, and whose right had 6 D. of myopia, and during the last few days had been failing. A fair sized hemorrhage at the macula could be seen, with smaller outlying ones. The patient described seeing a black ring in front of the eye, and when he shut his eyes, he could see a green ball.

Mr. Doyne said the two cases which interested him most were those having the colloid body formation, as the ophthalmoscopic appearance in these was so definite and the area of change so clearly defined. Yet this type of degeneration was not uncommon, and he was not aware that red vision was usually associated with it. In the first of the related cases, the phenomenon was noticed on first waking and in twilight, i. e., times when a change in the stimulation of the retina was taking place. He asked whether, on the assumption that the colloid body formation interfered somewhat with the nutrition of the retina, it could be reasonably supposed that the retinal elements, which were stimulated by red rays, had a lower threshold.

Discussion.—MR. M. S. MAYOU related a case of the kind which he had had, the subject being a taxicab driver, who dared not take his cab out at night, as he saw approaching lights as a red wall, and could not discern whether lights were approaching or receding. Nothing wrong was found in the fundus, but probably there was present some arteriosclerosis. He was about 50 years of age. He got much better in 4 months, and resumed work.

MR. LESLIE PATON spoke of the number of cases of tabes which reported having green vision, and the small number who saw red. One or two tabetics were recorded as having purple vision, and some had a green meshwork with a purple field. In the transient amaurosis associated with cerebral tumor, definite color scotomata were recorded. Cases of migrain sometimes saw flashes of purple balls in a green field, and green balls in a purple field.

THE PRESIDENT referred to a case of optic atrophy in which a pale blue mist came over the eyes with the onset of twilight.

MR. FRANK JULER spoke of a case of his in which a medical man had his cataract extracted, and five months later said he had purple vision. The patient's own suggestion as to the cause was that some change had been induced in the reaction of the visual purple by the excess of blood which got in, a disturbance of the vitreous probably acting chemically on the retina; not a fatigue phenomenon, as it was worst when first awaking in the morning.

MR. R. A. GREEVES spoke of a patient under his care who had central cataracts, and to whom he gave weak atropin drops; but she discontinued using them because when she went out of doors everything *looked green,* and when she returned the home looked red.

MR. W. T. HOLMES SPICER remarked on the fact, that immediately after cataracts were removed the patients saw everything blue. Subjects of retinal hemorrhages saw patches of blood in their own retinae. A sudden drag on the eye muscles produced in him a brilliant edged purple light. Fuchs said that after a cataract extraction the eye had no longer the protection of the semiopaque lens, and when it entered a bright area, such as amid a fall of snow, erythropsia resulted; that the bright dazzle exhausted the visual purple, and there followed a rapid resecretion of visual purple.

MR. R. R. CRUISE suggested that in patients at or past middle life arteriosclerosis might be a causative factor.

Sympathising Eyes Examined Microscopically.

Mr. R. Affleck Greeves said only a few observations had been made on the sympathising eye, tho many were made on the exciting eye in sympathetic ophthalmia. Fuchs, in 1893, sought to show that the microscopic changes in the exciting eye were so constant as to enable a diagnosis to be made merely from the sections of the eye. Most books stated that the changes in the sympathising eye were identical with those in the exciting eye. In two cases which he had examined, however, there was a definite difference, and he now demonstrated on the screen sections from ten cases.

These showed that the character and extent of the inflammatory changes did not depend on the duration, or on the period between the injury to the exciting eye and the onset of the trouble in the sympathising eye. In four of the cases, the infiltrating cells were purely lymphocytes and plasma cells; in five, epithelioid cells were present, and in three of the five a few giant cells. The only constant factor in all the cases was iridocyclitis, varying in intensity and character in different cases. In five cases in which the cornea was infiltrated, the infiltrating cells were lymphocytes and plasma cells; there were no giant cells. The posterior part of the choroid was never more densely infiltrated than the anterior, which was the rule in exciting eyes. There was some involvement of the vitreous. The optic nerve was normal in three cases, edematous in five, and in only one case was the nerve sheath infiltrated. In three cases, which had not been operated upon, there was rupture of the lens capsule, and in two of these the iris and the swollen lens matter formed a necrotic mass. In these two the tension of the eye was low, in the third there was the usual secondary glaucoma.

Organized plastic exudation was present in four cases, and this fact was against Fuchs' view that plastic exudation in sympathetic disease, which was invariably present in exciting eyes, was due to a secondary infection, and not part of the actual process. The cases showed that there was no special characteristic of the sympathetic process, as shown by the microscope, which was of constant occurrence in sympathising eyes.

Discussion.—Mr. M. S. Mayou spoke of deposits beneath the epithelium in cases of sympathetic ophthalmia, and he showed slides of two cases which demonstrated this; there was a deposit of fibrous tissue between the epithelium and Bowman's membrane.

H. Dickinson.

ST. LOUIS OPHTHALMIC SOCIETY.

January 27, 1922.

Penetrating Gun Shot Wounds of the Eyes with a Report of Two Cases.

E. C. Spitze considered cases in which bird shot penetrate one or more of the coats of the eye. Such wounds are very dangerous, not so much from infection as from the mechanical effect. The missile being round and blunt inflicts a severe blow to the eye, and also lacerates and bruises the tissues to a considerable extent, especially if it strikes some object and becomes flattened or otherwise distorted before entering the eye, as is frequently the case. Double perforation of the globe, altho comparatively rare, is noted more frequently from this kind of gun shot wound than from any other injury.

A careful history of the case is of great importance. By it can be determined the size of the shot or bullet, the direction taken and the approximate distance from which it was fired. Many of these accidents occur while hunting, especially when two or more are hunting together. The size of the missile will also be indicated to some extent by the wound of entrance.

Prolapse of iris, escape of vitreous, penetration of lens or reduced tension indicate penetration.

Probing for the bullet is contraindicated in this day of perfected X-ray technic. Nothing of value is gained thereby, and additional harm may be done, or infection carried into the wound. The majority of injuries of

this type are not infected. The X-ray gives the final diagnosis.

Altho many such eyes are saved, most of them sooner or later become blind, or nearly so. When there is double perforation the outlook is as a rule more favorable. Here, as in other injuries, the ciliary region is the area of greatest danger.

Points of importance in the prognosis are: Size of the shot. Point of entrance. Whether it struck the eye direct; or by glancing off from some other object, thereby distorting its shape. Whether or not the shot remains in the globe, and the presence or absence of infection.

Treatment includes: Cleansing the eye and making the patient as comfortable as possible by the use of holocain and atropin. Any prolapsed tissue should be removed. Scleral wounds large enough to allow the escape of vitreous should be closed with sutures. It is permissible to attempt the removal of the shot if it can be seen or very definitely located in or near the wall of the eye, and in the absence of symptoms of infection.

Whether or not the shot is within the globe is at times difficult to determine, even with the Sweet localizer, when it is lodged in the posterior segment. A method that has been found useful in such cases is to have the patient rotate the eye in a given direction during the X-ray exposure. If the foreign body is within the wall of the eye or attached thereto, it will of course move, and be so indicated on the plate.

A few cases of removal of shot within the globe have been reported. It also has occurred that shot remaining in the vitreous chamber for some time have found their way into the anterior chamber, whence they were removed thru an incision in the cornea.

Immediate enucleation of an eye which harbors a shot is not advisable, as some of them maintain useful vision for a long time, or thru life. It is a well established fact that lead is well tolerated by the tissues, and cases have been reported where shot has remained in an eye for many years without damage.

Sympathetic ophthalmia very rarely follows penetrating gunshot wounds. Lead particles do not dispose toward sympathetic ophthalmia. The solubility of lead in the vitreous is very limited. The shot may become embedded in a cicatricial mass and remain without much damage.

Case Reports. I. E. L. F., 20 yrs. of age, laborer. Referred to me November 11, 1920. Had been struck in face by No. 6 bird shot at a distance of about 100 feet, while out hunting the day before. Right eye, small perforating wound 3 mm. below the margin of lower lid, just to temporal side of median line; also perforating wound of globe 6 mm. below cornea, just to temporal side of median line. Entire conjunctival sac much swollen. Pupil dilates only slightly after atropin, 1 to 120. Examination with ophthalmoscope unsatisfactory, altho there is a fairly good view of disc and vessels. The left eye shows small perforating wound in upper lid 12 mm from margin. Unable to find any wound in globe. Much swelling of entire conjunctival sac. Pupil dilates well after atropin, 1 to 120.

X-ray plates show a small shot in right orbit, below the optic nerve and about 4 mm. back of globe. Another shot in the lower portion of left maxillary antrum. Evidently this shot had struck the supraorbital arch and ranged downward. Right eye, vision 10/150; left eye, vision 20/150. Was given borax and boric acid wash and atropin, 1 to 120, to use four times daily. Next day the ophthalmoscope showed in right eye a small wound in lower portion of fundus, with hemorrhages. In left eye, some retinal exudate with small hemorrhages in extreme upper posterior portion, toward temporal side.

This wound in the fundus had a small central dark circular area, which had the appearance of a perforation, altho no other wound was found in the globe.

The third day: Small web like membrane appears in temporal portion of vitreous, left eye. 6th day: Right eye vision 20/100; left eye 20/60. In the course of about four weeks, the lesions in the fundus had almost entirely

healed. Vision 20/60 in each eye. Left eye, vitreous clear.

December 18th, five weeks after the injury, patient returned with failing vision and some pain in right eye. Right eye, vision fingers at six feet. Ophthalmoscope shows separation of the retina in entire lower temporal quadrant. Ordered holocain, 1 to 120, in normal saline solution, used every two hours; patient kept in bed one week. After about five weeks retina was apparently entirely reattached. Right eye, vision 20/200; Left eye, 20/24. Patient was allowed to return to work and was told to report in two weeks. When he did report in three weeks, there appeared to be a small detachment of the retina in the same region.

After one week he again disappeared and did not report for observation for over two months. When he did come on May 11, 1921, there was complete posterior synechia, right eye. Pupil did not dilate after atropin. Wassermann negative. Globe becoming much injected and soft. There was flattening at site of perforation. Unable to make out any details of fundus with the ophthalmoscope. After several weeks treatment the inflammation subsided, but the globe remained soft. Vision 0.

Left eye has recovered, in good condition. Vision 20/20.

Fourteen months after the injury the eye was giving him no trouble, excepting that occasionally there was a slight congestion.

2. F. B., switchman, 36 years old. Came November 7, 1921, stating that he had been struck in face and left eye by No. 8 bird shot from a distance of about 100 feet the morning before, while out hunting. Four shot struck the face, one shot penetrating left eye, ball, apparently in extreme nasal portion of the sclera. Conjunctiva much swollen and congested. Ophthalmoscope shows vitreous filled with fine floating shreds. No details of fundus. Vision, motion of hand at two feet.

The X-ray showed a shot embedded in the orbit, about 6 mm. back of globe, and about 8 mm. away from the optic nerve, nasal side.

Was given holocain and atropin, 1 to 120, to use every four hours, and kept in bed for a week. One week after injury, vision motion of hand at 18 inches. No details with the ophthalmoscope. Two weeks after the injury, the eye became more inflamed, and there was deposit on Descemet's membrane. Prescribed Hg. $Cl._2$ grain 1/12 t. i. d.

The swelling decreased and the uveitis gradually subsided, so that by January 7, 1922, two months after the injury, the globe was almost entirely quiet. Vision, light perception. No details of fundus with the ophthalmoscope.

Discussion.—Dr. John Green, Jr. It is not always necessary or even advisable to suture scleral wounds made by small bird shot. If the eye has the benefit of aseptic management from the start, the wound will usually epithelialize rapidly. Protruding vitreous should be clipped off, but the presence of a small bead at the level of the wound does not call for any interference. A large scleral wound is best closed by means of the double overlying conjunctival flap first proposed by Lee M. Francis.

Many cases leave one in doubt, after localization, whether the shot is far back in the globe, in the sclera, or outside. In such cases a double exposure on the same plate, with the globe in two different positions, will give some indication as to the exact position of the shot. It should be remembered, however, that a shot that has actually passed thru the sclera posteriorly may still be attached to the globe, and hence move with the movements of the globe. Immediate evisceration is hardly ever advisable. Bird shot wounds are usually aseptic, and often a presentable tho usually sightless globe, can be retained.

Trachomatous Pannus and Ulcer Treated with Tinctur of Iodin.

Dr. C. W. Tooker presented a case treated after the method of Dr. W. A. Shoemaker. S. P., white, male, aged 25, consulted me on November 30, 1918, for the relief of inflamed eyelids, which had distressed him for several years.

The conjunctiva of the upper lids were found to be thickened by the papillary form of trachoma. In other respects his eyes were about normal.

Thruout the next four months, his lids were treated with silver nitrat, copper sulphat solution in glycerin, bichlorid solutions, and milder collyria. He was in fairly good condition in April, 1919, when he went to work in a railway construction camp, distant from any means of special treatment. Until March 1921 he used glycerin solutions of copper sulphat (Prince's method) whenever his eyes gave him any trouble.

On March 28, 1921, he again came under my care, stating that his eyes had been comfortable until very recently. The conjunctiva of his upper lids were again velvety, and a thin pannus had begun to develop over the upper portion of his left cornea. On the temporal side of the left cornea, a small superficial corneal ulcer was present. There was no iritis.

After anesthetizing the everted upper lid with repeated applications of 1% holocain solution, the surface was touched firmly thruout its exposed extent with a cotton tipped probe in a mixture of tinctur of iodin and twice its volume of water, none of the solution being allowed to get on the cornea. The conjunctiva was held exposed to the air for a brief time, and instillations of holocain again used at intervals of 5 minutes until the eye was comfortable. A solution of holocain, 1 gr. to the ounce of 1/10,000 bichlorid, was ordered for home use every 2 hours in both eyes. The right upper lid was treated with silver nitrat.

On March 30, 1921, a similar treatment was given with an iodin dilution of 50%. On April 5, seven days after the first use of iodin, the ulcer had healed and the pannus looked thinner. On April 19th, 21 days after the first use of iodin, there was no noticeable pannus and scarcely a trace of the corneal ulcer. The patient was given copper sulphat solution in glycerin for home use, diluting the strong solution 1/10, and using the drops 3 times a day.

On August 22, 1921, he returned for treatment. A thin pannus had spread over the upper part of the right cornea, and a superficial ulcer had developed, altho he had been using his copper solution fairly regularly.

The upper right lid was anesthetized with 4% cocain solution, and tinctur of iodin (U. S. P.) applied in the manner described above. After several instillations of 1% holocain solution, the conjunctival sac was filled with boric acid salve and the eye bandaged for 24 hours. The holocain and bichlorid solution was again ordered for use at home. Five days later the ulcer had healed and silver nitrat was used. Four weeks after the use of the iodin the cornea was clear. This patient has been seen recently and his eyelids are in good condition. The disease has probably not terminated, but involvement of the cornea in the trachomatous process has been controlled, and there has been a marked improvement in the condition of the lids.

This method of treatment affords a means of counteracting the disastrous effects of trachoma on the cornea, and supplements the various therapeutic measures employed in the management of the disease. In a review of the Year Books during the last 17 years, I have been able to find only two references to the use of iodin in trachoma.

In 1907 Schiele (Arch. f. Augenheilk.) advocated the use of pencils of pure iodic acid to the palpebral conjunctiva. His method did not meet with approval. In 1914, at the Oxford Congress, A. Brown presented a paper on the treatment of trachoma and mentioned the use of iodin.

Discussion.—Dr. J. Green, Jr. I should like to ask whether the lower or upper palpebral conjunctiva is touched with tinctur of iodin; also whether any slough or pellicle is to be seen on removal of the bandage at the end of 24 hours?

Dr. W. A. Shoemaker. My method of treating trachoma with pannus with tinctur of iodin, to which Dr. Tooker has referred, was adopted six years ago. The first case on which I used

it was one that had not yielded to the usual treatment, but was gradually getting worse. The result was so satisfactory, that since then I have used this method exclusively.

After thoroly anesthetizing the parts with a one per cent holocain solution, tinctur of iodin (U. S. P.) is thoroly applied to the conjunctiva of both upper and lower lids, including the cul de sacs, being careful not to allow any of the iodin to touch the cornea, and to keep the lid everted until the iodin has dried. Frequently the pain is quite severe, in spite of the previous use of holocain. If so, more holocain is instilled every few minutes until the eye becomes comparatively comfortable, when the cul de sacs are filled with an ointment composed of 15 grs. of boric acid to one ounce of vaselin; and a bandage is applied for twenty-four hours. The following solution is then directed to be used every two hours:

℞

Holocain	grs. 2
Atropin sulphat	grs. 2 to 4
Sol. adrenalin chlo. (1/1000)	ʒi
Sol. hg. bichlorid (1/10,000) q.s. ad.	ʒi

Enough atropin should be used to keep the pupil well dilated.

The tinctur of iodin is used once a week until the pannus has disappeared, after which a 10% solution of copper sulphat in glycerin (Prince's method) is prescribed to be used three times daily, beginning with one drop of the solution in twenty drops of water and increasing the strength gradually to one to eight or ten; being careful not to use it sufficiently strong to cause much pain for more than a few minutes. Some patients can, of course, stand it much stronger than others.

Recurrent Cyclitis Following Sphenoiditis.

C. W. Tooker said that altho pathologists are agreed that inflammations of the ciliary body are rarely isolated disease processes, but are parts of a uveitis, still there are at times clinical phenomena that seem to be localized in the ring of uveal tissue between the iris and the choroid. Fuchs describes a simple cyclitis as essentially a chronic affection with deposits on Descemet's membrane and in the vitreous body. The iris in these cases is not much affected.

J. P., male, white, aged 56, consulted me on February 14, 1914, because of asthenopia. His optical correction gave him normal comfortable vision. He needed no further attention until December 14, 1918, when he developed an inflammation of the left eye. The inner upper portion of the ciliary body was very tender to pressure, the vitreous slightly hazy, and the posterior surface of Descemet's membrane was faintly clouded with small deposits. There was marked circumcorneal injection, pain and photophobia, but no definite iritis. A general physical examination by a competent family physician revealed no abnormalities with the exception of some bad looking teeth. A skiagram of his teeth was negative as to apical infection. Dr. Greenfield Sluder discovered a low grade suppurative sphenoiditis and has had him under treatment at various times during the last three years. A Wassermann blood examination and a complement fixation test for tuberculosis were negative. The patient refused to undergo tuberculin tests or treatments.

On April 17, 1919, he again experienced an attack of cyclitis in the left eye located in the upper outer quadrant.

On May 19, 1919, a similar attack began in the upper outer and inner quadrants of the right eye. In November, 1919, he suffered from a similar but milder attack in the left eye.

In January, 1920, a more severe cyclitis again affected the upper half of the same eye. Three rhinologists differed as to the condition of his tonsils, but Dr. Sluder did not recommend their removal. Another skiagram of his teeth revealed some probable apical infection, and appropriate attention was given them.

In November, 1920, his right eye was the seat of another attack, and in February, 1921, there was a recurrence.

In October, 1921, his left eye suffered a similar attack. Between attacks, the eyes did not show any evidence of inflammation.

Despite the many attacks of cyclitis he has undergone, his vision with correction is normal and the only evidence of abnormality is the presence of several whitish dots near the discs not noted in the examination made in 1914. The usual treatment in such cases combined with nasal treatment was practiced.

We are accustomed to look for focal infection in uveal inflammation, and the evidence seems to point rather definitely to a low grade suppurative sphenoiditis as the causative factor in this case. Thoro dental treatment did not affect the pathologic process and his tonsillar condition was not significant. Syphilis and tuberculosis could not be proven as etiologic factors. According to Collins and Mayou, tuberculous infection of the uveal tract is a proliferative, exudative process, frequently spreading thruout the iris, ciliary body and choroid.

Many of the recurrences of cyclitis in this case have been preceded by a "stuffy head cold," and a few minor attacks have been aborted by prompt nasal treatment and thoro catharsis. His general physical condition has been excellent.

Focal cyclitic attacks of this sort are not reported often in the literature and may not form an actual clinical entity, but the association of a low grade suppurative sphenoiditis in this case with recurrent attacks of cyclitis seems very definite.

J. W. CHARLES, M.D.
Editor.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Meeting of February, 1922.

Bilateral Aniridia.

DR. J. B. BLUE reported the case of L.T. S., 46 years, poor vision all life. O. D., cataract extraction August, 1919, and this eye had been useless for 9 years previous to operation, but with correction had useful vision until few months ago. The eye now has a peculiar opacity like a faint membrane in the lens region.

O.S. Cataract extraction August, 1920. Vision in this eye is good, 20/40, and with some glasses placed on end of the nose can read J. 1.

Discussion.—DRS. STANFORD and ELLETT think the membrane in this case is an adventitious hyaloid membrane, rather than a capsular opacity.

Unilateral Nystagmus.

DR. E. C. ELLETT reported the case of Mr. Yates, seen February, 1911. He always had nystagmus and held his head to one side, with poor vision and diplopia for three days. Vision 20/60, O.U. O.S.—1.00 = 20/30. R. pupil larger than L. Oph. normal. Crossed diplopia, divergent squint. Fields normal.

February 4, 1911, ptosis.

February 7, 1911, typical oculomotor paralysis.

January, 1918, O.D. 20/100, with glasses 20/30. O.S. 5/100 unimproved. Nerves pale.

January, 1920, nystagmus worse O. S. and worse looking to side. O.D. 20/100 with glasses; O.S., M.O. Optic atrophy.

Aug. 9, 1921. Fields of vision as reproduced in Fig. 1.

February, 1922, same, almost unilateral nystagmus. Primary atrophy. Neurologic examination; diagnosis C. S. lues, not paresis.

July, 1920, spinal fluid 4 plus W. Cell count 60. Gold chloride paresis curve. Blood 4 + W.

Discussion.—DR. J. B. BLUE says that this is nearly a unilateral nystagmus. He remembers seeing two cases in the army (twins), who could cause a voluntary nystagmus by focusing on a distant object.

DR. JOHN J. SHEA says that this is a true ocular nystagmus. There is nothing in the labyrinth.

DR. E. C. ELLETT thinks that the explanation of the unilateral nystagmus is the paralysis of the internal rectus of the right eye.

TESTS OF THE VESTIBULAR APPARATUS.

SPONTANEOUS NYSTAGMUS.

Looking to right—Rt.—quick to rt.—Lt.—quick to rt.

Looking to left—Rt., slow—quick to rt. Lt., rapid—quick to rt.

Pointing, R., touches. L., touches.

NYSTAGMUS

Looking up—Rt.—quick to rt. Lt.—deviates in —quick to rt.

Looking down—Rt., slight; Lt. rapid.

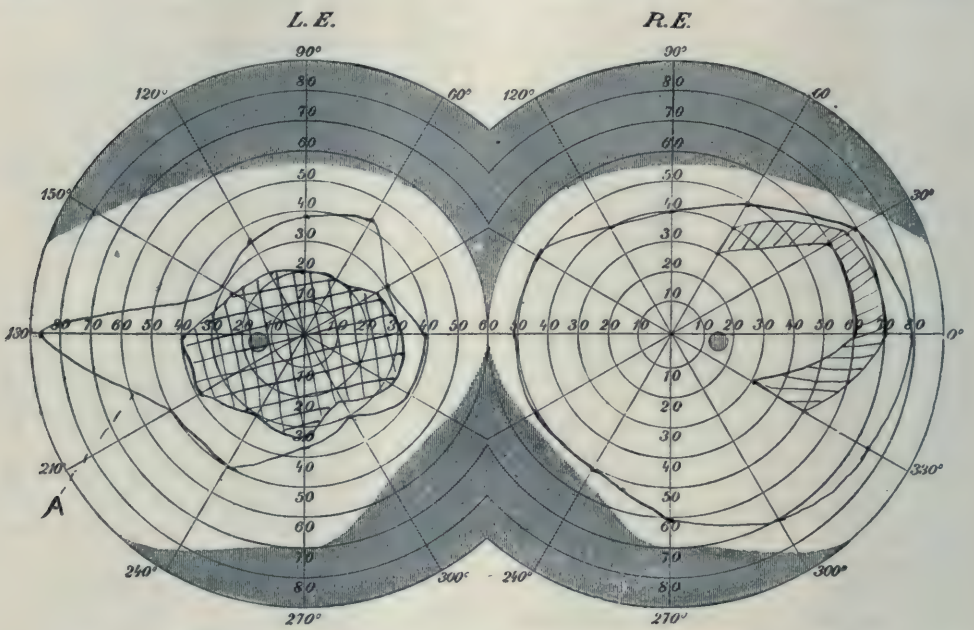

Fig. 1.—Fields of vision, Mr. Y., taken August 9th, 1921, with electric light fixation.

Vertigo—*No vertigo.*

Romberg—normal.

Turning head to right—normal.

Turning head to left—normal.

TURNING

To right—Amp. Increased.

Duration: In 45 seconds returns to average—intensifies without changing character.

Pass points 8″ with both hands.

Nystagmus, as above.

Vertigo, normal, 16 sec.

Past pointing, normal.

To left—Amp. Increases.

Duration: 45 seconds back to average rate.

Pass points to right 8″ with both hands.

Nystagmus, as above.

Vertigo, normal, 16 sec.

Past pointing, normal.

Piece of Steel Removed From Eye.

W. LIKELY SIMPSON presented a man, R. C., colored, who presented himself at office February 7, 1922, with the history of having been struck in the left eye with a piece of steel 24 hours previous. The vision was p and p good. Cut of cornea at limbus and upward. An X-ray (Doctor Chapman) showed a foreign body in the lower anterior part of the eye. The magnet was applied, and a small piece of steel removed with slight prolapse of iris, but as this piece of steel was removed the cornea was still down toward the magnet. The magnet was again applied, and quite a large piece of steel was removed after enlarging the wound.

The eye has been very red and swollen since, also the anterior chamber shallow and the lens opaque and swollen. The eye is much improved the last two days.

The second study of the X-ray located the small foreign body. It seems to me that this case is very interesting, as one can easily see what might have happened if the large foreign body had been removed first.

Discussion.—Dr. E. C. Ellett said that this illustrates why we should not do anything until we get localization by a competent X-ray.

Sympathetic Ophthalmia.

Dr. Robert Fagin reported: During the past year I have treated a seventeen year old boy, who had had a very severe sympathetic ophthalmia. March 13, 1921, a knife blade was stuck into the vitreous of left eye. The blade entered the eye thru the cornea and iris in the region of eleven o'clock, but did not seem to injure the "danger zone." When I first saw the patient on March 14th, the corneal wound was gaping and filled with prolapsed iris, and there was already a traumatic cataract. When I found that the limbus at each extremity of the wound was uninjured, with a 4% anesthesia, I removed the lens and cut off all the prolapsed iris, then, covered the wound with conjunctiva. No complications followed and patient went home March 21st.

All went well until April 30th. Six weeks after the injury to left eye, the right eye began to show signs of sympathetic irritation. The patient presented himself, and the left eye was at once enucleated and the usual treatment of atropin, argyrol and hot applications was given to right eye. Large doses of sodium salicylat were given internally t. i. d. Patient again went home in a week, but was instructed to continue the treatment. Despite the home treatment, a second attack, much worse than the first, came three weeks after the patient returned home. The patient presented himself at the office. All the classical symptoms of a severe sympathetic ophthalmia were present. For two weeks patient was given heroic treatment. The attack now subsided and the eye remained quiet until July 12th. Then came another slight attack. After this I saw the patient no more until the middle of September. The condition at this time was chronic. The pupil was irregularly dilated and "fixed." There was some exudate in the pupil, but no more pain. The vision was down to .1 or less. Treatment was continued.

January 18, 1922, patient came in again for examination. Vision now was down to 4/200. The eye had been quiet since September, but there is quite a membrane in the pupillary space. The patient's father told me that for the past two weeks he had noticed a dark object below the pupil. The moment I looked at the eye, I saw what he was trying to describe. In the dark room with oblique illumination and the binocular loupe this black object greatly resembles the lens. It seems to be covered with iris, but seems to be below; in the anterior chamber—in the region of six o'clock—on a plane in front of the iris. This lens like object is immovable and can not be transilluminated. With a —3.50 ⌒—2 axis 90° lens, the vision is improved from 4/200 to 20/200. This lens has been given for constant wear. The atropin has been kept up t. i. d., and most of the time 2% has been used. We have tried to leave it off, but, after two or three days, the eye feels uncomfortable and signs of inflammation return, and when we start the atropin again, these symptoms subside. We are still keeping up the large doses of sodium salicylat, internally, according to Gifford's advice, and it is surprising how well these enormous doses are accepted. He weighs 130 pounds and has taken as much as 200 grains of sodium salicylat in twenty-four hours. This was given after meals, well diluted in hot water, and essence of pepsin or sodium bicarbonat was given to make this drug more easily accepted.

I present this patient, because, as far as I am able to find in my small experience, and in literature, it is a new complication in sympathetic ophthalmia.

Discussion.—Dr. E. C. Ellett thinks that the diagnosis in this case is difficult to make. The salicylat treatment, as outlined by Gifford, is one grain a day per pound body weight. He has found that it is better to give smaller doses and give them more often. The lens seems to be in place and the refraction bears this out. He would let the case alone and not try operative interference. Might try thyroid extract along with the

salicylats. He asked why argyrol was used.

Dr. Fagin thinks it a part of a small lens. Has vision 20/20 first in the good eye. Thinks also that the anteroposterior diameter has been lengthened by inflammatory attacks. He used argyrol to allay inflammation.

S. S. Evans,
Secretary.

WILLS HOSPITAL OPHTHALMOLOGICAL SOCIETY.

March 1, 1922.

Dr. Burton Chance, Chairman.

Synchisis Scintillans.

Dr. McC. Radcliffe exhibited a case occurring in the left eye of a woman of presumably good health.

Tay's Choroiditis.

Dr. Zentmayer showed a case of Tay's choroiditis in a woman of advanced years. The choroids of each eye were affected by the guttate formations. The areas extended from the discs to well out into the temple regions and were the seats of yellowish white, well defined elevated spots. The macular zones had undergone senile degeneration, and, in the lower field of the left, a quite large black spot was present, evidently the result of retinal degeneration. The patient's chief complaint was of a most annoying wide scotoma noticed on awaking and persisting well into the morning. Dr. Zentmayer stated that Tay's choroiditis is commonly found late in life, altho it does occur in earlier years, when, singularly, the visual acuteness may not be greatly diminished, if at all. In such cases, the disease is quite sharply defined, the units consisting of small yellowish bubbles more or less elevated, appearing like a heap of cobblestones. He recalled that such a case is illustrated in de Schweinitiz's textbook.

Diabetic Retinitis.

Dr. Zentmayer also showed a case in an elderly woman,, under observation for two years past. Sugar has been found present at all examinations. In the right eye are marked evidences of arteriosclerosis, with linear opacities and a few characteristic hemorrhages. In the left eye, the signs are not as typical; there are, however, small fluffy white areas and hemorrhages. Dr. Zentmayer spoke of the futility of depending upon the ophthalmoscopic picture without consideration of the accompanying findings in diabetes, for, frequently, the retinal signs in albuminuric disease may present similar characteristics.

Discussion.—Dr. Chance stated that he has had under observation a case in a young man whose sight has been but little affected. The areas are sharply circumscribed in the lower outer quadrant in each eye.

Superficial Punctate Disease of Cornea.

Dr. Louis Lehrfeld reported from Dr. Chance's service a case of superficial punctate disease of the cornea occurring in one eye of a young Italian, who had been under observation for the past four weeks. The disease first manifested itself by pain which lasted for three or four days. When first examined there were seen three or four vesicles which became umbilicated, and then were followed by maculation in the superficial layers of the membrane. The maculations were seven in number when first counted; now there are sixteen, and from discreteness, they later tended to coalesce to form larger areas. The process has been subepithelial and, at no time has there been exfoliation, or necrosis. There has been no inflammatory reaction, or pain, since the first weeks. Nothing has been found in the young man's general health to account for the affection. Tuberculin has been injected in ascending doses without reaction.

Discussion.—Dr. Zentmayer was inclined to regard the case as one of corneal dystrophy of neuropathic origin. In reply to a question as to the importance of testing the sensibility of the cornea, he said that the present methods of testing the sensibility yield uncertain responses; one subject varies from another, and the two eyes often are unequally affected. Usually the periphery is less sensitive than the apex. In dystrophic cases the sensibility is usually diminished.

C. S. O'Brien,
Secretary.

AN INTERNATIONAL CONGRESS OF OPHTHALMOLOGY.

HELD AT WASHINGTON, APRIL 25-28, 1922.

President, DR. GEORGE E. DE SCHWEINITZ, Philadelphia.

SCIENTIFIC SESSIONS.

Teachings of War in Ocular Surgery.

PROF. F. DE LAPERSONNE, Paris. The world war brought the advantage of need to treat our patients under most varied conditions and in close association with general surgery, and produced great advances in the treatment of orbito-ocular injuries. These are rarely limited to the orbit, so that the ophthalmologist must intervene in cranio-facial wounds. Prompt decisions must be reached regarding questions in this province, and the organization of military medical staffs must meet this requirement.

The most frequent extensions of orbital injuries are: 1. Multiple fractures of the malar bone extending into the zygomatic arch or superior maxilla. 2. Fracture of the superior maxilla involving the sinus. 3. Fractures of the upper margin of the orbit extending to the base of the brain, with all their consequences. 4. Fractures of the superior internal angle involving the frontal and ethmoidal sinuses. Foreign bodies embedded in the orbit showed the greatest variety and some were of excessively large size. Such orbital injuries are likely to be attended with the chorioretinal lesions studied by Lagrange.

In the treatment of these injuries the most frequent complications are meningitis and meningoencephalitis, which may run an extremely variable course. Death may occur in two or three days, or the onset may be insidious and the fatal termination in three or four weeks. Tetanus has been rare, and gas gangrene has not been observed. The infection of such wounds is usually secondary, not introduced at the time of injury. But the benefit of early treatment is very striking. The most dreaded complication of ocular injury, sympathetic ophthalmia, was rarely noted in the first years of the war. The risk of it seemed not to justify enucleation. This was a decided contrast with what has been observed after industrial accidents. When it did arise its course was often rendered comparatively benign by the use of neoarsenobenzol.

Very generally the wounded came under ophthalmic care too late. There was great need of early treatment which would include: 1. The immediate systematic examination of the wound, both superficially and in its depths and extensions into the surrounding tissues and neighboring cavities. It should always include radioscopic and radiographic examination, with the exact localization of foreign bodies and their removal by electromagnet if possible.

2. Local anesthesia should commonly be employed, using instillations of 4 per cent cocain for superficial explorations of the conjunctiva. But generally by injections of novocain, 1/4 of one per cent, with two or three drops of adrenalin 1:1,000 to the c. cm. Such injections should be made behind the eyeball and deep in the orbit, or in the region of the ciliary ganglion. Local anesthesia of this kind has largely replaced general anesthesia by chloroform, ether, etc. With such anesthesia the fear of shock and the danger from preexisting organic disease largely disappear. Local anesthesia is more difficult to obtain when the parts have become inflamed, an additional reason for the early treatment of orbito-ocular wounds.

3. Lesions of the eyeball, whether thru the lids or the conjunctiva, require slightly different treatment. But primary suture after the removal of foreign bodies is appropriate to both. It is easily understood that war injuries of this character require a more grave prognosis than industrial injuries. If only debris of the eyeball remain and there is no hope of preserving the function of vision, ablation of the anterior segment of the eye or enucleation should be done, especially if there is severe pain or violent reac-

tion. Operations that can be covered with conjunctival flap should be performed with the advantage of this method. Plastic operations must be practised where there is loss of tissue.

4. Extensive orbital lesions may require free orbitotomy, even if the wound involves the eyeball. Such an incision permits the removal of foreign bodies, fragments of bone, or large hematomas. Incision along the outer margin may take the place of a Krönlein operation.

These lessons, learned from war, are applicable to injuries occurring during peace.

Detachment of the Vitreous.

In the absence of Sir W. T. Lister, his paper on this subject was presented by Mr. E. Treacher Collins.

Development. From the beautiful work of Mawas and Magitot, it seems that the vitreous is mainly epiblastic in origin, and that its development takes place in three stages:

(1) There is a primordial vitreous formed almost entirely from the retinal epithelial cells, especially from those of the pars ciliaris, and to a very slight extent from the cells of the lens.

(2) This primordial vitreous is temporarily pushed aside by the invasion of the mesoblast, both that part which comes in thru the choroidal cleft, and that which enters the secondary optic vesicle anteriorly with the inclusion of the lens. This mesoblast forms what they call the transitory vitreous, viz., the vascular tissue which temporarily occupies the greater part of the socalled "vitreous chamber," and ensheathes the lens, but soon disappears, remaining only as the walls of the hyaloid canal.

(3) Corresponding with the disappearance of the vascular transitory vitreous, the primordial vitreous tissue undergoes great development and becomes the main vitreous body, or definitive vitreous.

In this definitive vitreous, fibers are found which are continuous with and closely united to the cells of the pars ciliaris. The firm adherence of the vitreous to the pars ciliaris found in postnatal life is thus associated with its origin; while to the rest of the retina the vitreous is merely applied, or if attached, only very slightly. One would expect, therefore, that on contraction, detachment would take place at the posterior region from the retina proper, with a heaping up of the vitreous into a mass situated behind the lens and the pars ciliaris.

Structure of Vitreous Body. The vitreous in its fresh state is a pellucid, soft, gelatinous mass, apparently structureless except for the socalled "corpuscles" of the vitreous, of which some show ameboid movement and contain large vacuoles. That the rest of the vitreous is not entirely homogeneous is shown by the fact, that when thrown on a filter, a small portion always remains, altho by far the larger part drains away and may be collected as clear watery fluid. When hardened and stained, a certain amount of structure can be made out. Definite fibers, already referred to, can be seen chiefly in the external part of the vitreous and especially in the region opposite the ciliary body, to which the fibers are firmly attached. These fibers in the ciliary region are in series with the fibers of the suspensory ligament, which indeed are considered by many to be merely a highly developed group.

Investing the whole of the vitreous, a *Hyaloid Membrane* has been described as a specialized thin, glassy layer. Schäfer describes the hyaloid as consisting of two layers in the ciliary region, an inner one which continues forward to the investing coat of the vitreous, and an outer fibrous layer, which is closely adherent to the pars ciliaris, and anteriorly passes forward to fuse with the capsule of the lens and forms the suspensory ligament. Of the existence of the suspensory ligament there is, of course, no question, but certain observers have doubted the existence of these other vitreous structures.

When fixed in chromic acid, more or less distinct lamellation of the vitreous can be seen especially in the part next the retina, which, in the human eye, is of a firmer consistence than the central portion. In addition to this indication

of concentric lamellation, a radial marking has also been observed in sections made transversely to the axis of the eyeball in similarly hardened specimens. (Hanover.)

Some consider that the indications of concentric lamellation and radial striation and even the hyaloid membrane are artefacts, due to hardening reagents, but I think when certain pathologic states of the vitreous are examined, they afford strong supporting evidence of some such structural formation. We may look upon hemorrhage or infiltration into the vitreous as most useful staining reagents of the vitreous.

Now it is well known that the vitreous may undergo degenerations; it may liquefy and lose its gelatinous character, and when liquefied it may either remain clear—as is so often seen in cases of high myopia—or it may become impregnated with products of degeneration, such as cholesterin, as in synchisis scintillans. It would be expected that in a vitreous which had become liquefied any structural characteristics, if they existed, would be lost, and if subsequently it were infiltrated with round cells or blood, a comparatively even or general infiltration would take place. Whereas if infiltration takes place in a previously healthy vitreous, some evidence of structure, if such existed, might be expected to be seen in the first stages, before the whole vitreous became purulent; it is this evidence I hope to demonstrate. It is probably the anatomic structure of the vitreous which is the chief deciding factor that brings about the varied appearances of the vitreous seen on pathologic examinations after effusion of blood or round cells into it.

In septic infection of the vitreous, a great variety in the distribution of the round cells is seen:

(a) In some, the vitreous is evenly cloudy or evenly purulent. This may be due to the preexisting liquefied state of the vitreous, or to the suppuration having been so prolonged that any early uneven infiltration had become lost, or to a special infection causing liquefaction of the vitreous pari passu with the infiltration.

(b) In others the infiltration is far from homogeneous, thus:

(1) Stilling's canal may be seen demarcated in pus.

(2) In other cases we see pus extending backward from the ciliary region, after anterior infection, in streaks or Medusa like locks, while in others there is very definite and beautiful lamination of the layers of pus.

Such irregular distribution of the round celled infiltration must be determined by some cause, and could be determined by lamellation of the vitreous or some remains of it. Thus cases with streaks or layers of pus in the vitreous appear to give strong support to the view that the vitreous body is not originally structureless but lamellated.

Tho for years a specialized investing coat of the vitreous or hyaloid membrane has been described, others, Mawas and Magitot for instance, state that no such structure exists. Pathologic conditions again throw light on the matter. When looking microscopically at specimens with infiltration of the vitreous associated with some degree of detachment, tho in some the posterior boundary of the vitreous is shaggy and there is no definite edge, in others the vitreous has a perfectly defined margin. Such definition of the vitreous must have a determining cause. It seems impossible to avoid the view that there is some specialized layer limiting the vitreous which, provided it has not been previously degenerated, is capable of checking, to some extent, the progress of invading leucocytes; but if the vitreous were degenerated and liquefied, such limiting membrane would break up and disappear, and when infiltration takes place, no definite demarcation of the vitreous is visible, but its limits are shaggy.

Another group of cases may throw some light on the structure of the vitreous, tho this is doubtful, but they are interesting and afford scope for speculation.

When a foreign body has passed thru the vitreous it is not uncommon to find straight thin planes of fibrous tissue transversing it in one or more

places. These fibrous planes are very surprising; doubtless they are the result of hemorrhage, but one naturally wonders why the hemorrhage should be limited to a definite plane. One would expect to find a tuft of hemorrhage rather than a defined thin sheet. I think two suggestions can be put forward in explanation:

(a) Either that the explosive force of the penetration splits the vitreous just as a jelly (containing insufficient gelatine for artistic cooking) splits on a plate, or as a glacier, which we are told follows the same laws as semi-solids, splits into seracs as it passes over a projecting portion of its underlying bed, or

(b) That some radial structure of the vitreous has determined this peculiar distribution of the effused blood.

Whatever may be the exact explanation of the latter group, the examination of the pathologic specimens shown, tends to confirm the view that the vitreous has a structure of a lamellated character—and also that it possesses a definite and specialized limiting membrane.

Detachment of the Vitreous. Detachment of the vitreous is dismissed by Fuchs in his text-book very summarily as being much less common than was thought to be the case. He writes: " . . . Such detachment is much more rare than was formerly supposed, when observers were misled by the presence of artefacts produced by the hardening of the specimens," inferring that in most instances when it is found on pathologic examination, it is due to the fixing reagent.

That detachments are certainly not all due to fixing reagents is proved:

(1) By the fact that in eyes fixed in formalin, detachment of the vitreous is not present in a large number of specimens.

In some it is present, in others, the vitreous, clear or infiltrated, may fill the whole or practically the whole of the space normally allotted to it. If the formalin caused contraction, detachment would surely be present in every case examined, except where there was some morbid attachment of the vitreous to the retina.

(2) By the presence of changes, shortly to be described, which—from their complicated structure—could not possibly be postmortem artefacts, especially those found in the clear retrovitreous space unattached in any way to the vitreous body.

While it is well known that certain reagents, such as alcohol, cause extreme contraction, there seems no reason for thinking that formalin causes any alteration in the size of the vitreous. Detachment of the vitreous is without doubt commonly found in eyes fixed in formalin and examined pathologically, and there seems to be clear evidence that such separation of the vitreous from the retina proper has taken place during life, and is due either to actual contraction of the vitreous body or to its liquefaction, resulting, in either case, in the occurrence of a zone of nearly clear fluid between the retina and the vitreous, such as has been for long described in myopia.

In cases of the more chronic infection of the eye, all stages of contraction are met with. In the early and slighter cases, what little separation from the retina exists is only at the posterior pole, the vitreous still remaining attached to the optic disc. This is the last spot for detachment to occur in this posterior region, and it is the site at which greater adherence would be expected, since it is here that the hyaloid vessels passed from the disc into "Stilling's Canal." In the later stages of chronic inflammation, the vitreous becomes contracted up into a firm mass behind the lens. Between these two extreme forms—the slighter and the greater—all intermediate varieties are found.

An interesting and important variety is met with when the vitreous becomes adherent to the retina, at one or more spots. Such adhesion may be the result either of inflammation in the retina due to a foreign body striking it within, a perforation of the ocular coats from without, or from some other cause, such as a hemorrhage from the retina bursting into the vitreous or a patch of retino-choroiditis. When contraction of the vitreous subsequently

takes place, it remains, as it were "pegged out" at certain parts, as we shall see later.

Now what the factor is, apart from traumatic loss of vitreous, which causes the diminution in its bulk and consequent separation or detachment from the retina to take place, it is difficult to say.

I now pass on to show how detachment of the vitreous determines certain pathologic conditions.

I. Suppurative Inflammations. When the head of the optic nerve has been irritated by toxins or organisms brought to it by the lymph stream and pus pours out from the disc, we find quite different appearances in specimens where the vitreous is in situ, from those where the vitreous has been detached. Thus in the former we have seen "Stilling's Canal" injected with infiltrate, or others where a fountain of exudates jets out into the vitreous. Whereas in similar cases of irritation of the optic disc when the vitreous has become detached, a beautiful fan like growth of pus may extrude out from the papilla into the zone of clear fluid behind the contracted vitreous.

When the so called "abscess of the vitreous" is formed round a retained foreign body lying somewhere in the retrolental area, the shrunken and infiltrated vitreous closely enwraps the bag of pus, while the rest of the vitreous chamber is filled with clear fluid. In other cases, as we have already seen, when the vitreous becomes attached to the retina, we find it contracted forward but "pegged out" to the retina at certain spots. Again in other cases of chronic infection with detachment of the vitreous, punctate deposits on the retina may occur—as I described in a paper at the last Congress of the Ophthalmological Society of the United Kingdom.

II. Hemorrhage. If a hemorrhage takes place into the vitreous from the retina or choroid, we know from Parsons' work the exact changes that occur. Either the blood elements may be completely absorbed, or if fibroblasts enter the retina or choroid, a spindle or a fan of fibrous tissue may be formed such as one sees in retinitis proliferans, whether of the "so called" idiopathic or of the traumatic variety.

I have a particularly beautiful specimen of a small hemorrhage which burst into the vitreous from the retina on concussion, following which the vitreous began to detach and a pointed tag of vitreous, with a hemorrhagic tip, was left attached to the retina. As the vitreous contracted, the pointed tag dragged on the retina and caused this also to detach. That the retinal detachment was present during life and not the result of the fixative, is clearly demonstrated by the fact that in the postretinal space there is an albuminous coagulum, which must have been there before excision.

It seems to me one ought to lay great stress on these tags of fibrous tissue in the vitreous which are attached to the retina, for I believe they give rise to at least four separate and important phenomena. As is well known, by their traction, they may cause: Folding of the retina; detachment of the retina, and I believe they may also give rise to holes in the retina, and to the flashes which occur on movement in highly myopic eyes.

Now it is well known that hemorrhages especially in myopic eyes are all too common, and, in the specimens shown, it is seen that fibrous tags may develop as a result of hemorrhage. When once they are formed, then by their traction not only a detachment, but I think one variety of hole in the retina may result. There are at least five varieties of holes in the retina:

The nearly circular holes which occur at the macula as the result of a blow, from a comparatively slowly moving, nonpenetrating missile, on the front of the eye. Other circular lacunae at the macula, associated with retinochoroiditis, exactly resembling those following a blow, which are very probably due to bursting of cysts at the macula. Then there are peripheral holes due to traumata, with or without detachment. There are also holes associated with retino-choroiditis (elsewhere than at the macula) which has caused adhesion of the retina to the choroid. Subsequent

detachment of the retina results in a rent in this membrane.

Horseshoe Shaped Rents. It is these "horseshoe" rents which I believe are due to traction of vitreous tags, for in these we often notice that the central portion of the horseshoe is pulled inwards by a tag of fibrous tissue. It would seem extremely probable that traction of such fibrous tissue attached at one end to the retina, and at the other to a contracting vitreous, would be sufficient to cause a rent.

THE HYALOID MEMBRANE.

The last section of my paper deals with, what I propose to call, *"Holes in the Hyaloid."* That such a membrane or differentiation of the outer layers of the vitreous exists is, to my mind, proved as already stated, by the fact that tho in some cases of contraction and detachment of the vitreous its edge is quite shaggy and uncertain, in others it is quite clearly defined. Its existence is supported by other evidence both clinical and pathologic.

(1) Thus in the case of an injury from a stone, a hemorrhage occurred at the macula, which gave rise to a star figure of fibrous tissue, from which radiated out multitudinous delicate rays immediately over the retina. These were much too fine to be foldings of the retina such as one sees in cases of retinal edema, etc., and I have no doubt they were due to foldings of the hyaloid.

(2) Again we come across cases clinically in which with the ophthalmoscope a fine membrane is seen in the vitreous chamber, 3 to 6 D. in front of the retina, in which there is a clear cut hole. I have seen three such cases, and in two of them there was a patch of old retinochoroidal atrophy.

SUMMARY.

(1) The vitreous has some structure and is not homogeneous, and this structure is one of concentric lamellation as described by Hanover.

(2) That there is a limiting membrane to the vitreous, i.e., the hyaloid, is not a myth.

(3) Under certain conditions degeneration of the vitreous may occur, and both the hyaloid and all other structure of the vitreous may disappear.

(4) Clinical cases are seen which can be explained only by supposing that such a hyaloid membrane has been thrown into folds.

(5) Thickening in the hyaloid may take place as the result of inflammatory processes occurring in the adjacent retina, which have caused adherence of the vitreous to the retina, so that if subsequent detachment of the vitreous occurs, this limiting membrane may tear round the edge of the adherent area, and a hole in the membrane may result, which is visible with the ophthalmoscope.

(6) Detachment of the vitreous is common during life, and its presence in pathologic specimens is not the result of the fixing reagent, at any rate when formalin has been used.

(7) If from any cause the vitreous has become adherent to the retina, from injury, haemorrhage or inflammation, then on detachment the vitreous becomes as it were pegged out at certain spots, and traction is exerted on the retina which may cause either flashes of light on movement of the eye, folding, detachment or even holes in the retina.

(8) Detachment of the vitreous is a necessary precursor to certain pathologic conditions, e. g., punctate deposits on the retina, and the peculiar fan formations of pus or fibrous tissue, which are sometimes found extending from the optic disc.

Diaphragm Lamps in Ophthalmology.

Prof. Allvar Gullstrand, Upsala, Sweden. The examination of the living eye for diagnostic purposes and scientific investigations is highly facilitated by a suitable illumination of the field. These conditions are essential.

The source of light must be uniform, sharply limited, with a high specific intensity, and a sharp optical image of this source of light must be produced. The *slit lamp* and the *aspherical lens* (an aplanatic lens with a nonspherical surface of revolution) answer these conditions. But the slit lamp is not the only suitable lamp. It is only a special type of the *diaphragm lamp*. When the dia-

phragm has a circular aperture, another type results for which I suggest the name *hole lamp*.

SLIT LAMPS.

That the first diaphragm lamp for ophthalmologic use was a slit lamp is due to practical reasons. Of light sources then available, only the arc lamp and the glowing filament of the Nernst lamp had sufficient luminosity combined with a sufficient area of uniformity. As the latter represented the simpler and more easily available means and proved practicable, I preferred it. If the greatest effect is desirable, the shape of the diaphragm is determined by the shape of the source of light. Therefore, with the Nernst lamp, the diaphragm must be a slit. By a system of lenses an optical image of the glowing filament is procured, which can be brought to coincide with the slit. At first I used this lamp for ophthalmometric investigations.

During the war, the fabrication of the Nernst lamp ceased and good Nernst filaments cannot be bought now. Therefore, in the instruments of Zeiss, the Nernst lamp has been replaced by a nitra lamp, which consists of a glowing narrow spiral of tungsten filament in a glass bulb filled with an inert gas. But this lamp has several disadvantages as compared with the Nernst lamp.

For certain methods of reflexless ophthalmoscopy, a small incandescent lamp is a sufficient source of light. The filament must be straight, and an optical image of it is projected in a slit in the same way as in a Nernst lamp.

HOLE LAMPS

Now there is another lamp with sufficient specific intensity on the market, namely the *pointolite* lamp, which is a tungsten arc lamp enclosed in a glass bulb containing an inert gas at low pressure. There are several types, but the smallest of them is sufficient for ophthalmologic purposes. The lamp is lighted by a strong ionization current of short duration, but demands only a current of less than 0.5 amp. when burning. Moreover, the voltage is higher than that of the nitra lamp and, as a consequence, the necessary resistance is less encumbering. But the greatest advantage over the nitra lamp is the perfect uniformity of the light source, which is a ball of tungsten used as an anode. If an optical image of this ball is projected in a circular aperture, an ideal hole lamp can be obtained.

The glass bulb is sealed up on the top, and when the lamp has been used some time deposits from volatilized tungsten are seen here on the inside. It is consequently preferable to mount the lamp perpendicularly to the optical axis of the tube. In this position the optical image of the ball is not appreciably deteriorated by the refraction in the glass bulb, and the light is less weakened by the deposits. But for many purposes the lamp can also be mounted along the axis in the same way as the Nernst lamp. It can in these cases replace the Nernst lamp in the ordinary slit lamp. Tho the slit is not then filled out by the optical image of the ball, and tho only a part of this image is used, this combination answers well for many methods. Finally, with a special arrangement, the lamp can be used in a slit lamp for focal illumination when its optical image is projected on the lens.

FOCAL ILLUMINATION

The superiority of diaphragm lamps for focal illumination is so great that other lamps should never be used for this method of examination. In every clinical case something more can be seen by using the aspherical lens in connection with these lamps than with ordinary lamps and lenses. For current clinical use, it is not desirable to lose time by immobilizing the head of the patient on a support for the chin. If this is not done, a rather wide cone of light is necessary to allow for the motions of the patient's head. For this reason the optical image of the source of light has to be projected in the diaphragm, as in the original Nernst slit lamp, and the uniformity of the source of light is a great advantage.

The focal illumination with a diaphragm lamp and aspherical lens demands a certain amount of skill, but is soon learnt with a little practice. The lens is to be held with its most curved surface turned to the light, at a distance of about 40 cm. from it and perpendicularly to the ray that passes thru its center, so that the diaphragm is situated

on the optical axis of the lens. That this is really the case can be controlled by projecting an optical image of the diaphragm on the cornea. This position of the lens once found, the only difficulty consists in moving the lens parallel to itself, as the optical image is projected deeper in the eye.

However insignificant this difficulty is, the device of Henker to fix the lens on an arm in connection with the lamp has probably contributed to render the method more accessible to oculists. With this device, the immobilization of the patient's head by a support for the chin is desirable, but this complication offers an advantageous compensation in the possibility of using the microscope for examination. As a narrow beam of light is sufficient, the optical image of the source of light can, in the way already described, be projected on the lens, whereby the nitra lamp renders the optical image of the slit perfectly uniform.

When the pointolite lamp is substituted for the nitra lamp in this apparatus, the optical image of the slit is not uniformly bright, the middle seeming darker than the ends. This inconvenience is caused by the spherical aberration of the lens system contained in the lamp tube in connection with the smallness of the glowing ball, and can be avoided by a special construction, in which the distance between the lens system and the slit is reduced to a minimum.

Vogt has insisted on the use of a very narrow beam of light for facilitating the localization in the third dimension. But as the slit grows smaller the chromatic aberration of the aspherical lens grows more disturbing. For this reason an achromatic combination of lenses was preferred to the aspherical lens. Such a substitution is possible because a small aperture is sufficient and indeed, in some cases, desirable for microscopic examination.

For the microscopic examination of the angle of the anterior chamber, Koeppe has devised both a hydrodiascopic chamber and a suitable contact lens. Another contact lens, which makes the eye highly hypermetropic, has enabled him to use the microscope for the examination of the deeper parts of the vitreous and of a certain area of the retina. Finally, with a third contact glass of annular shape and containing a conical reflecting surface, he obtains the necessary illumination for ultramicroscopy of the cornea with a dark field. He also uses polarized light for the microscopic examination of the living eye.

SIMPLE CENTRIC OPHTHALMOSCOPY

Under this name I have described a method of ophthalmoscopy of great value for current clinical work, and for which the "hole lamp" can be used as well as the slit lamp. The diaphragm lamp affords a means of suppressing the corneal reflex and enabling the ophthalmoscopic examination of the central part of the fundus without any decentration of the hole of the mirror in respect to the axis of the examined eye. In the light reflected by the mirror, the hole acts as an opaque body and throws a shadow. If the source of light is sufficiently small, a full shadow of considerable extension can be obtained, and to suppress the corneal reflex it is sufficient that the center of curvature of the cornea (more exactly its evolute) be situated within the full shadow.

Thus if a diaphragm lamp is used as a source of light for ophthalmoscopy by the direct method, the corneal reflex can be extinguished by an adequate movement of the mirror. The observer sees a bright spot on the fundus and the corneal reflex. If care is taken that his own nose does not throw any shadow on the mirror, he needs only move the mirror so that the spot on the fundus is centered on the corneal reflex to see the latter vanish. Looking thru the central parts of the refracting surfaces of the eye, he then sees more details in the macula and in its neighborhood than he can see with the ordinary method. He can also perform the examination without dilatation of the pupil, in cases where nothing is seen of the macula with the ordinary method. To obtain a field of reasonable extension, the mirror should be concave with a rather short radius of curvature and a narrow hole. The small mirror of Morton's ophthalmoscope answers well.

This method again demands a certain amount of skill which, however, is easily

acquired by a little practice. Its advantages induce me to give here some hints. An ophthalmoscopist who is able to give the mirror the correct position after he has approached the patient till the two fronts are in contact, will meet with no difficulties, if he tries the method the first time on a case with dilated pupil. But many oculists are accustomed not to approach the patient until they have seen the pupil red by throwing light in it at a distance of some 15 or 20 cm. If this is the case. the lamp must be placed so far off that the cone of light extends from the patient's eye to the point from which the examiner desires to see the pupil red.

If the pupil is dilated, the extinguishing of the corneal reflex by appropriate movements of the mirror is soon learned. The illuminated part of the fundus shows a darker spot, which is situated in its center, if no shadow from the nose of the observer is thrown upon the mirror, and as soon as this darker spot is centered on the corneal reflex the latter vanishes. The spot is a half shadow from the hole of the mirror, and can be avoided by bringing the lamp to a distance of 12 to 15 cm., and by using an angle of incidence of about 45 degrees on the mirror. In this way the method gives the best results, but also offers greater difficulties. The short distance diminishes the width of the cone of light at the place of the mirror, so that the observer must learn to find the correct position of the ophthalmoscope after having approached the patient, and the great angle of incidence causes a shadow of his nose on the mirror and a consecutive diminution of the illuminated part of the fundus, if special care is not taken.

As in ordinary ophthalmoscopic work a smaller angle of incidence is used, it may be necessary to change the habitual position of the ophthalmoscope in respect to one's own face. The new position is easily found out by using the large angle of incidence and a greater distance of the lamp. The shadow from one's nose on the mirror is then seen on the form of the illuminated part of the fundus. I have entered upon these details because the superiority of the method is so evident that nobody who has learned it will voluntarily use other lamps for ophthalmoscopy by the direct method. The slit lamp affords a somewhat greater field than the hole lamp.

DIAPHRAGM LAMPS IN OTHER METHODS OF EXAMINATION.

For the examination of the *transparent media* of the eye, diaphragm lamps are unrivalled. Fine dustlike opacities of the vitreous afford a striking example. It is well known that by the ordinary method such opacities can be seen with the plane mirror in cases where nothing is seen if a concave mirror is used. The usual explanation is that the light reflected by the concave mirror is too strong, but the real cause is that the plane mirror illuminates a smaller area of the fundus. Since this illuminated area serves as a source of light, and as shadows are the more conspicuous the smaller the source of light used, it is obvious *a priori* that the diaphragm lamp must give the best results. It is easy indeed to prove the sensitiveness of the method. If the lamp is placed at a distance of about 40 cm. and a plane, perforated mirror with a narrow hole and with a concave glass of 10 or 12 diopters behind it is used, it is often possible to see shadows which are caused by the distribution of the fluid moistening the cornea, and which change when the latter is wiped by the eyelid. Accordingly opacities of the vitreous that, by the ordinary method, are seen only with the utmost difficulty as finest dust appear as a sharply defined network.

In *skiascopy* the most reliable results are obtained when a transparent unperforated mirror is used. A hole in the mirror always causes a shadow which complicates the phenomena in the neighborhood of the point of reversal, and which makes it impossible to find the refraction in the central part of the pupil. Therefore a plate of glass with parallel faces is the best mirror, and the loss of reflected light is supplied by the specific intensity of the diaphragm lamp. This method can be regarded as an evolution of the method of Jackson or that of Wolff, according as the hole lamp or the slit lamp is used.

If a hole of small diameter is used as a diaphragm and the mirror consists of a thin glass plate fixed in a position

which allows the optical image of the hole to coincide with the observer's pupil, the sensitiveness of the method is highly increased and allows the examination of the aberration of the eye and of pathologic asymmetry. I have described this method under the name of *objective stigmatoscopy* in Helmholtz' handbook. With a diameter of only one-half mm., the dilatation of the pupil can be avoided in many cases. A diameter of 1 mm. gives excellent results if the pupil is dilated.

My successor in the chair of Ophthalmology in Upsala, Professor Lindahl, has described a new method of *transillumination* of the *eyeball* with a Nernst hole lamp. He substituted a hole on the apex of a cone for the slit in a Nernst slit lamp, and used this lamp at first in the ordinary way, bringing the border of the hole in contact with the scleral conjunctiva, in order to see whether the red light in the pupil was weakened by a tumor. But he found that the intensity of the light allows another method.

If the cone of light is directed in the pupil the illuminated part of the fundus constitutes a source of light sufficiently intense to show directly the shadows of a tumor and, moreover, the shadow of the ciliary body on the sclera, which appears brilliantly red. Thus Lindahl's method is an inversion of the old method used for diagnosing tumors. As might be expected from the shape of the diaphragm, the pointolite lamp has proved superior to the Nernst lamp in Lindahl's instrument. A rather large area of the fundus being illuminated, the source of light for the transillumination is large, and shadows on the sclera can be expected only from the opaque bodies situated near this membrane. But the ora serrata is distinctly seen and, as a rule, the ciliary processes also throw a visible shadow.

CENTRIC REFLEXLESS OPHTHALMOSCOPY

Before the construction of the slit lamp, the reflexless ophthalmoscopy, developed principally by Thorner, was unable to give the best possible optical image of the fundus, inasmuch as the light that entered the eye of the observer had to be refracted in an eccentric part of the optical system of the examined eye. For the same reason, the maximum effect of stereoscopy could not be obtained. If the light that enters the observer's eye has to pass thru the central part of the pupil of the examined eye, it can be shown that the light which illuminates the fundus must pass thru a peripheral zone which, to avoid the light reflected diffusely in cornea and lens, must be the narrower, the greater the ophthalmoscopic field that is desired. This involves the use of a source of light with high specific intensity, and necessitates the projection of an optical image of it in the plane of the pupil. It is not necessary that this optical image be small, as the superfluous part of it can be projected on the iris, but the optical image afforded by the slit lamp is sufficient, and therefore the Nernst slit lamp was used by my reflexless ophthalmoscopes.

The large ophthalmoscope brought on the market by Carl Zeiss contains an aspherical lens not only in the examination system, but also in the illuminating system. The light of the latter is reflected into the examined eye by a transparent glass prism of small angle. A plate with parallel faces would give two different images, of which only one could be used if the plate were sufficiently solid. Therefore the prism is so calculated that both images coincide. In this instrument, the Nernst lamp can be directly replaced by a nitra lamp or by a pointolite lamp. I have verified that the latter affords a sufficient illumination tho the lamp be mounted along the axis of the illuminating system, and altho only a part of the optical image of the glowing ball can be projected in a part of the slit.

The same is the case with the large instrument for simplified reflexless ophthalmoscopy. If two small reflexes caused by the surfaces of the aspherical lens are allowed, the construction of the instrument is considerably simplified and only one aspherical lens is necessary. The light emerging from the slit is given the appropriate direction by means of a double reflection in a rectangular prism silvered on its hypotenuse face and combined with a decentred lens.

For this method of ophthalmoscopy I also have devised a hand ophthalmoscope, which is held in one hand, the aspherical

lens being held in the other. The illuminating system is a slit lamp in which a small incandescent lamp is used as the source of light. Again this instrument demands a little skill, which must be acquired by practice. Ordinary ophthalmoscopy by the indirect method should be replaced by this method just as well as ordinary ophthalmoscopy by the direct method is to be replaced by simple centric ophthalmoscopy.

CENTRIC PHOTOGRAPHY OF THE FUNDUS

It is evident that the same principles that led to the centric reflexless ophthalmoscopy are available theoretically for the photography of the fundus. In practice difficulties arise from the necessary intensity of light, and as long as perfectly aplanatic condensers of sufficient size and aperture are not available, the sun is the only available light source. But if an optical image of the sun is projected in a hole, the method of the simplified reflexless ophthalmoscopy is applicable, and has been elaborated by Dr. J. W. Nordenson, who has obtained excellent results with a rather compendious apparatus. Thus the light illuminating the fundus for photography is taken from what could be named a hole lamp with the sun as a source of light.

Ocular Symptoms from Sting of Scorpion.

In the absence of Dr. Jose de Jesus Gonzalez this paper was presented by the secretary for Spanish, Dr. F. M. Fernandez.

There are in Mexico various species of Centrurus, among which the C. exilicauda (Wood) predominates. According to Professor Ochoterena, it is identical with the scorpion of Durango, of such direful reputation for the activity of its poison. The poison is a transparent, acrid liquid, altered on contact with the air, is soluble in water and precipitated by alcohol, iodin, ammonia, tannin, silver nitrat, lead acetat, and ammonium sulphat.

The general symptoms of the poisoning include in the period of excitement: sensory symptoms, pain in the sting, crawling sensations, as if ants were walking on the skin, hyperesthesia. Secretory symptoms: Salivary hypersecretion, sweating, lacrimation, mucous secretion. Vasomotor symptoms: Congestion of the face, conjunctiva, and other mucous membranes. Thermic symptoms: Fever. Motor symptoms: Spasms of the unstriated muscles, contractions and convulsions of the voluntary muscles, exaggerated reflex actions. In the period of depression there are paralysis, tremblings, ataxia.

The ocular symptoms and complications include: Period of excitement; painful disturbances (crawling, tickling of lids), lacrimal secretion, vasomotor (conjunctival hyperemia). Motor: Contractions of extrinsic muscles, miosis, and spasm of accommodation. Sensory: Diplopia, micropsia, photophobia, impairment of sight. There is a period of depression, with paralysis and paresis of extrinsic muscles and of accommodation.

As unusual conditions, there have been noticed two cases of blindness which lasted for a few days, there being edema of the papilla in one and simple congestion in the other. Both ended in cure.

PROPOSITIONS FOR CONGRESS ACTION

These propositions were referred to a Committee to report subsequently. See page 407.

Value of Letters and Characters as Visual Tests.

Dr. A. E. Ewing, St. Louis. A committee was appointed by the Ophthalmic Section of the American Medical Association in 1914 on "Standardizing Test Cards." Working separately with various patients of all types, each committeeman gave his conclusions as to the visual value of each of the Gothic and block letters as compared with the Landolt "broken ring." The average percentage visual value of these results is shown in the accompanying table:

Gothic			
L	0.62	F	0.81
A	0.71	C	0.85
T	0.72	K	0.88
V	0.74	O	0.88
H	0.74	D	0.88
Z	0.76	X	0.91
E	0.77	R	0.93
N	0.79	S	1.05
P	0.79	B	1.16

Block			
L	0.71	P	0.81
T	0.74	D	0.82
V	0.78	Z	0.84
U	0.79	N	0.85
C	0.79	E	0.85
O	0.80	R	0.88
Y	0.80	S	0.89
F	0.81	C	0.92
		H	0.92
		B	1.00

These results revealed that few of the letters could be depended on to give so-called normal visual acuity as compared with the "broken ring" of Landolt. They further confirm Snellen's observation that the "block" letter was superior to the "Gothic" letter for the construction of visual test types. Also they standardized, so far as was possible, the relative visual value of each letter.

In this table it is shown that the letter "L" is the most readily seen of any of the letters at a given distance, but it is well known to all ophthalmologists that persons who are able to recognize the "L" have sufficiently good vision to pursue any of the ordinary vocations necessary to earn a living.

"In all times letters and numbers have been preferentially employed by ophthalmologists in the investigation of the powers of vision," observed Donders, in his work on refraction, in 1864. After the lapse of another half century, during which period workers in ophthalmology have increased by thousands, it may be safely claimed that this observation is now an axiom with letters still in the ascendant. The investigation of the Committee above mentioned has given each letter a definite visual value in comparison with an accepted visual standard. Experience has proved that a visual acuity of 75 per cent. of this visual standard indicates sufficiently good vision for even the highest grades of occupation in securing the living. The army accepted 50 per cent. as sufficient for ordinary occupations, and practically 75 per cent. for the finest rifle work.

With the above data at our command, the rational method of disposing of this vexed question would be to accept as the standard or normal vision the vision measured by any of the block letters from T to H in the report of the Committee, when these letters are drawn to the one and five minute scale of Snellen. The same rule should apply to characters when they are drawn practically within these limits. This would mean a variation in the visibility of 18 points, but experience has further demonstrated that this counts for little after the 75 point limit has been passed. The reading of any one of these letters should be considered as the 100 mark instead of the reading of the broken ring of Landolt, and visual acuity above this standard 100 mark should be indicated as normal plus. Such an arrangement would satisfy every visual requirement.

Ophthalmologic Versus Anatomic Nomenclature.

Dr. M. Uribe-Troncoso, New York City. It is a basic rule in all anatomic descriptions to consider the subject standing in front of the observer. In ophthalmology, however, this rule is entirely disregarded, and the text-books and treatises describe the lesions and symptoms and show the pathologic sections in the position of the observer's eye.

This departure leads to confusion, misunderstanding, and mental strain, which are especially noticeable in the sections of neurology and troubles of motility of the eye, and in the recording of the visual field. The proper understanding and diagnosis of some brain conditions and hemianopsia are made difficult by the necessity of reversing the mental picture of the lesions from the observer's eye to the patient's eye in front of him. The same happens with the troubles of motility of the eye, where the anatomy and physiology of the ocular muscles are taught in reference to the observer's eye and the clinic examinations, limitations of movements of the eyeball in case of paralysis, subjective examination for diplopia, etc., are made in front of the patient. Thus two different standards are set up without sufficient reason or practical benefit.

The field of vision as recorded with the campimeter corresponds to the observer's eye standing behind the patient. With the perimeter the testing is made in front of the patient, but the recording in the chart needs to be reversed to the posi-

tion of the operator's eye. The same is true of the Bjerrum screen.

The author proposes to discard the ordinary position and adopt the anatomic standard, considering always the patient in front of the observer, and recording the visual field as it is projected into the space and actually found on the arc of the perimeter.

The ordinary charts when seen by translucency accurately represent this anatomic position.

Standards for Field Taking.

Dr. Luther C. Peter, Philadelphia. The variable elements in field taking can be included in two groups:

First: Those which are due to a lack of care on the part of the operator or on the part of the patient, and to inadequacy of the necessary equipment.

Second: Those which tend to yield variable results from day to day because of organic or functional changes in the visual pathway.

By perimetric study we endeavor to uncover the latter group for correlation with other symptoms. In order, however, to be of dependable value, the errors of the first group must be eliminated. To this end efforts have been made from time to time to develop a technic which can be made uniform, or approximately so, thruout the world, or wherever perimetry is practiced. Notwithstanding the frequent mention in literature of the need of a standard in our methods, and of urgent appeals by individuals for uniformity, the first group of variable factors continues to rob field studies of their real value, altho these errors can, for the most part, be eliminated.

In order, therefore, to approach this subject from an international standpoint, and to secure the cooperation of ophthalmologists from the countries here represented, the following resolution is respectfully submitted.

Resolved, That a Committee be appointed by the President of this Congress of Ophthalmology now assembled to consider and to recommend to this Congress, before its close, a standard in technic which may be applicable in any part of the civilized world.

First: With reference to the designation of the test objects of stimuli in degrees, minutes, or seconds.

Second: The designation of the pigments to be employed in the colored stimuli in definite and understandable language, by which they can be reproduced by the manufacturers of perimetric instruments.

Third: Uniformity in charts.

Fourth: A standard method of illumination.

Fifth: A method by which preexposure and surrounding field may be standardized for perimetric studies.

Sixth: The use of instruments in field studies with special reference to the needs of the case.

Seventh: Other recommendations which, in the judgment of the Committee, may seem advisable at this time.

(*To be continued*)

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THE WEARING OF CORRECTING PRISMS.

Prism exercises are used, like exercises with dumbbells and weights in a gymnasium, to render certain movements stronger; so that the tendency of the eye muscles will be to a more perfect balance. Correcting prisms are worn for a very different purpose, to permit single vision with the eyes in the position they naturally tend to assume. Some writers think that prism exercises are useless, while others believe that correcting prisms should never be prescribed.

There is really a dearth of careful reports giving the results of prolonged trials of either prism exercises, or the wearing of correcting prisms. On this account, the record given by F. W. Dean in the Transactions of the American Academy of Ophthalmology and Oto-Laryngology, of 350 cases in which correcting prisms were prescribed and the results noted after they had been worn for periods of from one to twenty years, is of especial value.

The statement that such wearing of prisms is "unscientific" is an indulgence in idle invective. It would be equally true or equally irrelevant to say it is "unscientific" to cut, stretch, or patch up with silk, catgut or scar tissue the tendons of the ocular muscles. Therapeutic measures are resorted to in order that patients may be relieved. Anything that accomplishes that purpose is "scientific," whether it fits a particular theory we hold or not. Let us first ascertain the facts; in the end our theories will have to be brought into harmony with them.

As to the assertion that the wearing of correcting prisms increases the degree of heterophoria, Dean's report shows that increase followed in 85 cases of lateral imbalance, and decrease in 84 cases; while in 96 cases the strength of prism required remained the same. In vertical imbalance, hyperphoria, the strength was increased in 19, decreased in 35 and remained unchanged in 31. The mass of the cases of lateral imbalance were cases of exophoria, and the average strength of prism worn increased from 1.53 to 1.57 prism degrees. For the cases of hyperphoria, the average strength of prism prescribed was at first 1.07 and at the last 0.9.

It has been recognized that there was a slight tendency toward exophoria with increasing age, which would account for all the increase observed in such cases. On the other hand relief from the strain of keeping up binocular vision is generally followed by increased power to sustain the ocular balance; and this would account for the decrease of hyperphoria which Dean has noted.

The seven ophthalmologists who spoke in discussion of Dean's paper were unanimous in their approval of his practice of continuous use of correcting prisms for low exophoria and hyperphoria; each citing observations in support of it. We may therefore assume that this is the established view of most American ophthalmologists. The skepticism with regard to this means of giving relief largely comes from Europe; where, too, the relief afforded by lenses of moderate strength is only slowly gaining recognition; and it may be fostered in certain quarters by a liking for operations. But there are certain differences between the indications for correcting lenses, and those for correcting prisms, that make the proper prescription of the prisms more difficult than the prescription of lenses.

For the great mass of cases of ametropia, clear vision with complete relaxation of accommodation gives relief from nerve strain and the symptoms that arise from it. With regard to the position of the visual axes, there is no single position of complete relaxation of nerve-muscle action, as there is in regard to accommodation when the emmetropic, or completely corrected ametropic eye looks at distant objects. The emmetropic eye will focus light under complete cycloplegia, or after death. But parallelism of the visual axes, or their intersection at the point fixed, is maintained only by continuous neuromuscular response to visual sensations. This neuro-muscular response must be perfectly coordinated for the two eyes, and the coordination varies with every change of position of body or head, or of the point fixed.

Because of the conditions to be met, the use of correcting prisms must be more a matter of experiment in the individual case, than the selection of correcting lenses. The comfort of the patient must be not only the goal to be reached, but our guide to progress in the right direction. This justifies the practice of beginning with comparatively weak prisms and increasing slowly toward the full correction of the heterophoria, until relief has been secured, or it is shown that comfort is not increased by such changes. Sometimes the final choice will be the prism that corrects all the heterophoria, sometimes one that corrects only two-thirds or half that amount.

It must not be expected that the relief from wearing prisms will always be immediate or striking. As with lenses, a period of "learning how to use them" must be passed thru, before they can be expected to give the most relief; and unusual difficulty of this kind may be an indication to give a weaker prism. But a certain minority of cases of heterophoria will not be relieved at all by wearing correcting prisms; and when the experiment has been fairly tried in such a case, the only wise thing to do is to give up the attempt. We do not know any way, except actual trial of prisms, to distinguish certainly these cases. Perhaps careful repetition and comparison of the various tests for heterophoria, may reveal one or more in which the reaction of such a case is different from that of cases that will be relieved by wearing prisms.

Such cases often present rather high degrees of error in muscle balance, and the failure to relieve them is probably responsible for much of the skepticism as to the value of prisms. A knowledge that they exist, and that they constitute only a small minority of cases of heterophoria, will prevent disappointment and allow a more just estimate of the clinical value of correcting prisms. But it should also be remembered that cases of moderate heterophoria not relieved by prisms are not the best cases for operative interference. For lack of a complete understanding of them they may be classed as "neurotic," and are best dealt with by careful restriction of eye work, and regulation of the manner of living.

E. J.

BLINDING BY GLARING HEADLIGHTS.

Many automobile accidents are reported in the newspapers, as due to confusion produced by the blinding glare from the headlights of another automobile. A simple application of physiologic optics could prevent most of them. It is possible the sudden shock of a very bright glare of light may lead to dangerous confusion or delay; but most such accidents are due to the temporary blinding that prevents the driver of the automobile from seeing his surroundings clearly enough for safety.

Just as looking at the sun blinds one temporarily for seeing objects by ordinary illumination, so looking at a bright headlight at night blinds one temporarily for seeing objects by the comparatively feeble light, by which we have to recognize the details of the road, for safety in night driving. The impression made on the retina, by even a well lighted roadway, is not strong enough to be perceived for some time, after looking at a headlight. Before the retina has time to recover, and the "after image" to fade away, the driver has run off the road, or collided with some fatal obstruction.

The essential part of the retina, for recognizing details of the road at night, is the part used in looking directly at an object; the part most sensitive for form, the central part of the retina, or macula. On other parts of the retina, the small spots of blinding, that the bright lights of an approaching automobile may cause, will generally be unnoticed and not a source of danger. If vision, at the point to which the gaze is directed, is kept good, the driver has the vision he needs to use and escapes the danger.

The rule of safety is, don't look at the headlights of an approaching automobile. To be effective when the danger comes, it must be practiced habitually; so that the natural impulse to look directly at a prominent object suddenly presented in the field of vision, shall be fully overcome. It does not answer to look at the lights and then look away, for the blunted sensibility of the retina may last for some minutes, much too long to avoid the danger.

The safe practice, when driving at night, is to watch the road constantly. When you become conscious of a bright light coming into the field of vision, do not turn your eyes toward it; but keep them steadily directed toward your side of the road, a proper relation to which means safety. You can judge the movement of the approaching light, quite well without looking at it; and it is only safe to look at the vehicle carrying it, when you have approached to a point where the bright glare no longer falls on your eyes.

In April, 1912, a total eclipse of the sun swept across Europe and more than 3,500 cases of "eclipse blindness" were reported as due to it. In June, 1918, such an eclipse swept across the United States; and subsequent extended inquiry of 600 oculists in the region of the eclipse revealed less than 100 cases caused by it, mostly very mild and temporary. A part of this difference was due to systematic effort to instruct the mass of the people as to the danger of watching an eclipse with unprotected eyes. Since the 1912 eclipse, widely promulgated propaganda calling attention to this danger has greatly decreased the numbers of those so affected by later eclipses in Europe.

If oculists everywhere will call attention to the exact nature of blinding by bright headlights, and the simple method by which each driver may protect himself, by never looking at an approaching headlight, the number of accidents due to this cause can be greatly lessened. Of course this should not take the place of the elimination of such dangerous lights, by proper traffic rules, or the better lighting of congested highways. But being a precaution which each can take for his own protection, it should be made known as widely and as quickly as possible among automobile drivers.

E. J.

BOOK NOTICES.

Medical Ophthalmology. By **R. Foster Moore,** B.Ch. (Cantab.) F.R.C.S., Assistant Ophthalmic Surgeon, St. Bartholomew's Hospital. Surgeon, Moorfields' Eye Hospital. London. Octavo, 308 pages, 80 illustrations. Philadelphia, Pa. Blakiston's Son and Co.

Among the names of those who have contributed original observations to medical ophthalmology, Hutchinson, Nettleship, Gowers, Gunn, Hughlings Jackson, and recently Gordon Holmes, Lawford and Parsons stand preeminent; and W. H. H. Jessop, to the memory of whom and to W. T. H. Spicer this volume is inscribed by their able pupil, have done most admirable work in this department of medical science. It is particularly satisfactory to have this book, that so completely presents its subject for the service of the ophthalmologist and the general practitioner of medicine, do justice to the writings of British workers in ophthalmology. But the workers of other countries are not ignored or unfairly treated. While of the bibliographic references, 48 per cent are to British writers, 24 per cent refer to the work of Americans; and Uhthoff, who stands far ahead of other observers of continental Europe in this line, is second only to Nettleship, while close after him come de Schweinitz and Cushing of the United States.

The references, which are printed at the foot of each page, show the review of the literature has been brought quite up to date, some of them referring to papers published in 1920 and a few in 1921. If brought together in approved form, these 800 references would constitute an imposing bibliography. But none of them are introduced for display purposes, they open to the student a direct way to the best literature upon the subject of the book; which offers, in the words of the preface, "a concise account of those pathologic conditions of the eyes and their connections . . . of interest in general medical diseases.

The text is divided into ten chapters, neither of which is given a distinctive chapter heading; but in the table of contents the various subjects treated in the chapter are stated. These might be grouped under the following titles: I, Lesions of visual centers, tracts, optic nerve and retina, including disturbances of fields, movements and reflexes. II, Diseases of the vessels and blood. III, Diseases of different parts of the nervous system. IV, Nutritive disorders. V, Specific infections. VI, Congenital and hereditary defects. VII, A miscellaneous group containing oxycephaly, migraine, herpes zoster, Mikulicz's syndrome, lactation and acute amaurosis of infants. VIII, Snow and eclipse blindness, electric amblyopia, neuroparalytic keratitis, etc. IX, Toxic amblyopias. X, The effects of parasites.

Thruout the book the purpose of telling concisely the principal facts is closely adhered to. The illustrations, diagrammatic or photographic reproductions, are all pertinent and valuable. Figures 3 and 4, explaining the representation of the different parts of the visual fields in the calcarine cortex, make the supposed relations more clear than would be possible by any verbal description. The representations of arteriosclerotic retinitis also make vivid and real the descriptions of these conditions. A thoughtful study of any section of the book will yield a comprehensive grasp of the general facts of the subject and their essential relation to the general disease in question.

The heavy faced headings to the paragraphs, in connection with the rather full table of contents, furnish a convenient guide to what the book contains, and make it a good book of reference. There is also a good index of subjects mentioned, and another giving the names of authors cited. In the latter, one might be misled by the omission of initials, where there has been more than one of the same family name. Thus one might suppose the references to Knapp were to the author of the well known work on medical ophthalmology, whereas two refer to Herman Knapp and the other two to the late P. C. Knapp of Boston.

Every important book of this kind, appearing for the first time, fails to mention some things that would naturally be expected to appear in it. We

find here no mention of the ocular conditions associated with epidemic jaundice (spirochetosis icterohemorrhagica), or with onchocercosis. Both of these conditions are of recent recognition (within 8 years), but they are important enough for mention. The ocular lesions of blastomycosis have been longer known (18 years), but they have never been adequately mentioned in European literature; and in this country cases often pass unrecognized.

However, Moore's Medical Ophthalmology is a book of many excellences and few defects—one that the ophthalmologist can safely buy for himself and recommend to physicians in other branches of practice, who wish a broad grasp of medicine as a whole, or to prepare themselves for the ocular emergencies certain to arise in any general practice. E. J.

American Academy of Ophthalmology and Oto-Laryngology. Transaction of the Twenty-sixth Annual Meeting. Dr. Clarence Loeb, Editor. Octavo, 470 pages, illustrated. Published by the Society.

Of this volume, about 160 pages are devoted to ophthalmology and 70 pages given to subjects, the interest in which is also shared by the otolaryngologist. In this latter division, a series of papers on industrial diseases and injuries, and their prevention and social service, with the discussion this symposium elicited, occupies about 50 pages. This section of the volume is placed first and is of especial value. It represents the experience, study and mature conclusions of a dozen earnest, careful workers in this field; and groups the most important facts relating to it in convenient form for all who are compelled to consider them.

It is certain that the enormous development and organization of industry, must in the near future be accompanied by methods and organization for dealing with attendant injuries and diseases in the most efficient and economic way. There are problems in medicine, surgery, hygiene and social organization that urgently need this kind of discussion by medical societies. To ignore the questions raised is impossible; to attempt to meet the issues they bring forth by blind opposition to change is a foolish manifestation of impotence.

The address of Prof. J. van der Hoeve, of Leiden, deals with diseases and intoxications that cause eye and ear symptoms, eye diseases which cause ear symptoms, ear affections which give eye symptoms and relations between the vestibular organ and the eye. It considers the last heading in most detail, and throws new light upon these relations. As here reproduced, it loses some of its interest and value thru the absence of the pictures that illustrated the address as originally delivered.

Among other topics considered in these transactions, the treatment of defects of ocular movement by operation and by the constant wearing of prisms is prominent. Blepharoplasty is the subject of three important papers. The Gullstrand slit lamp and the electromagnet are timely topics well treated; and worth while contributions are here published regarding other subjects.

A new feature is the inclusion of reproduced photographs of both the outgoing and the newly elected officers. This should be continued and will add to the historic interest of these volumes. But it will hardly be necessary to repeat each year the pictures of such officers as are reelected, or continued in office thru a series of years.

A portion of the volume that should be carefully studied by every member of the Academy is the 25 pages devoted to the minutes. There are briefly noticed some facts that are of importance to every American worker in these head specialties. In the first place, the Academy now requires, of all applicants for membership, the certificate of the American Board for Ophthalmic Examinations, or that of its own Committee on Examinations in Oto-Laryngology. Of the 80 applicants at the Philadelphia meeting, 32 who had complied with this request were elected.

From the Treasurer's report, we learn that the Academy now has a balance of $31.000, the interest on which will be available to assist and foster

original research along the lines in which the Academy is interested. The Committee on a National Medical Research Laboratory made a report urging the support of the American Medical Association in its efforts in this direction. The Committee on a Museum of Ophthalmic and Oto-Laryngologic Pathology reported its plan of cooperation with the Army Medical Museum in the collection, examination, reporting on and permanent care of pathologic specimens. What has been accomplished in this direction was an interesting part of the exhibits and demonstrations of the recent International Congress of Ophthalmology.

But the most notable event of the twenty-sixth meeting was its three days intensive graduate course in ophthalmology and otolaryngology attended by some 500 members. This marks an era in the history of graduate teaching in America. If the separate volume, publishing the work done in that course, which has been considered, should prove impracticable, it is to be hoped that a good account thereof will be reported to the Academy and published in the next volume of these transactions. E. J.

The Medical Annual: A Year Book of Treatment and Practitioners' Index. Associated Editors **Carey F. Coombs**, M.D., F.R.C.P., (Medicine) and **A. Rendle Short**, M.D., B.S., F.R.C.S., (Surgery). Fortieth Year, 1922, 596 pages, 52 plates and 143 illustrations in the text. Bristol, John, Wright and Sons Ltd.; New York, Wm. Wood and Co.

This book is designed to serve the general practitioner; but it is equally needed by the specialist who should keep in touch, in a general way, with the rapid advance of medicine on all lines. This is one direction in which the ideas of the essential unity of medical science and the need of a broad view of medicine on the part of every practitioner of the healing art, need to be emphasized and acted upon.

This volume is the work of 27 contributors, among whom ophthalmology is represented by A. E. J. Lister, Lt.-Col. I. M.S. (retired), formerly Professor of Ophthalmology, King George's Medical College, Lucknow. Lister contributes articles on Cataract, Diseases of the Cornea, Eye Affections Associated with Diseases of other Organs. General Eye Affections, General Therapeutics of the Eye, Glaucoma, Preventive Ophthalmology, Diseases of the Retina and Trachoma. These sections of the book comprise 26 pages, with 5 plates illustrating the Barraquer operation of phacoerisis and one colored plate copied from this journal, from which about one-seventh of all the references are taken.

But it is the sections of the book dealing with other branches of medicine that make the Medical Annual most valuable to ophthalmologists; like those on anaphylaxis, anesthetics, arteriosclerosis, blood bacteriology, cerebral tumors, cerebrospinal fluid, diabetes, ear diseases, endocrinology, food, Graves' disease, herpes zoster, etc. The headings under which the literature is reviewed are arranged alphabetically, and number in all about 250. There are 18 pages on endocrinology, 12 on nonspecific protein therapy and 5 on radiotherapy, all of which are subjects that are developing rapidly, and have important bearings on ophthalmic pathology and therapeutics. A special feature of this annual is the Editor's Table giving accounts of new pharmacal and dietetic preparations and medical appliances. These accounts are based on examinations and trials of samples sent to the Editor.

There is also a list of the books of the year, classified under the general subjects to which they refer. Those on the eye number 8; including the Transactions of the Ophthalmological Society of the United Kingdom, but neither of the three volumes of similar Transactions published in America. Neither books nor transactions published in languages other than English are included. There are also lists (20 pages) of medical institutions for mental diseases, sanatoria, nursing homes, and spas in Great Britain, each notice giving brief data of the place indicated.

The Official and Trade Directory gives boards of health, stations for training in vaccination, medical and scientific societies and periodicals. There are also a selected medical trades directory, blank pages with calendar for private notes and addresses, and an index to advertisements and life assurance offices.

There are almost 200 pages of advertisements in the book, making it a volume of almost 800 pages; but the paper employed, tho serving its purpose admirably, makes the Annual neither bulky or cumbersome. A series of these volumes would rapidly make a working medical library. Some features appeal especially to the British practitioner, but the digest of medical literature which constitutes the bulk of the work will serve the needs of any English reading physician or surgeon. It has the essential of a work for reference, a complete subject index, 37 pages referring to more than 5,000 topics.

E. J.

Verhandlungen der Ausserordentlichen Tagung der ophthalmologischen Gesellschaft in Wien, August, 1921, Edited by the Secretary, **H. Lauber.** 456 pages, with 97 illustrations in the text and 6 plates. Berlin, S. Karger.

This volume of proceedings, issued within 9 months after the Vienna Congress, of August 4 to 6, 1921, reflects great credit upon its Editor and on the meeting that it chronicles. Naturally one compares it with the volumes recording the annual meetings of the "Heidelberg Congress," and the comparison proves creditable to the present volume; which, especially, is better illustrated. Two of the plates present in colors, sketches of a rather varied collection of lesions at the macula, as seen both by ordinary and by "red free" light. Altogether 52 papers and 14 "demonstrations" are here presented. The titles of these will be found under the appropriate headings of current literature, in this and preceding issues, some having been already published.

An outstanding feature of the volume is the symposium on glaucoma operations. This was opened by two papers; that of W. Uhthoff on the clinical aspect, especially with regard to the iridectomy; and that of Wessely on the theoretic and anatomic aspects of the newer operations for glaucoma. But the most important practical facts came out in the discussion that followed these papers; in which ten speakers participated, ending with presentation of experience with the various operations in Vienna by three speakers. A. Fuchs presented the results of 350 operations by his father, Prof. Fuchs, in private practice. Safar gave the operations (112) of Prof. Meller at the Vienna Eye Clinic No. I; and Pillat those at Eye Clinic No. II from 1914 to 1921, including statistics of iridectomy, trephining, sclerectomy of Lagrange, cyclodialysis, and sclerotomy both anterior and posterior.

We find in this volume no indication of when it is proposed to repeat the Vienna Congress. But the success of the gathering and the substantial contribution it has made to ophthalmology justify a hope that it will be repeated.

E. J.

Section on Ophthalmology, American Medical Association. Presession Volume for the St. Louis Meeting, 1922. Octavo, 358 pages, with 85 illustrations. Chicago, American Medical Association.

The Section on Ophthalmology is one of the largest in the American Medical Association, much the largest in proportion to the number of members of the A. M. A. who are actively working in this field of medical practice. The presession volume distributed year after year, without cost to the members of the Section who have attended one of its meetings in the last five years, must have an important influence in keeping up the enrollment.

The cost is partly born by those who contribute the papers printed in it. This is a condition of getting their papers before the Section. It costs each author less than would an equal number of reprints of the same paper, and is distributed for him to the group of colleagues most likely to read and

appreciate it. The arrangement is very favorable to the authors. There is reason to believe it is also the very best kind of advertising propaganda for the Section.

The papers here printed are the property of the American Medical Association to be published subsequently in its Journal and in the Transactions of the Section, with the discussions to which they give rise, and with other matters. They will be alluded to, and the contents of some of them published subsequently in this journal. The most striking feature of the present volume is a series of reproductions of appearances of the iris as seen by the corneal microscope under illumination with the slit lamp. Some of these are two page plates and some printed in colors.

Those who have received this volume are to be congratulated. Others can get it in the Transactions by paying the very moderate subscription price charged them, and those who attend the St. Louis meeting and join the Section will be in line to receive similar volumes in succeeding years.

E. J.

CORRESPONDENCE.

The Washington Meetings.

To Our Readers: Of those who had come to Washington to attend the International Congress, many hurried away at its close. Foreign members who had already been away from home 3 or 4 weeks felt they must hasten back; and transatlantic steamers were beginning to be filled up by tourists going to Europe for the summer, so that good accommodations for later sailings were hard to get. Nevertheless, the meeting of the American Ophthalmological Society, May 1 and 2, was more interesting because of the presence of Collins of London, Mackay of Edinburgh, Rowan of Glasgow, Magitot of Paris and some others; while the American visitors remaining for this meeting made it the largest this society has ever held. The exhibit of pathologic specimens, slides, old books, etc., at the Army Medical Museum was also continued during this time.

The papers read brought out some important points. Luedde, of St. Louis, advocated for *glaucoma iridectomy* the forming of an "Elliot flap," under which the corneal incision was made; partly by a small oblique puncture with the keratome, which was extended with blunt tipped scissors, after the aqueous had drained away reducing the intraocular tension. In discussing the choice of method for *cataract extraction*, Dorland Smith, of Bridgeport, Conn., found indications exist for every method. Those for intracapsular extraction would limit that operation to a growing minority of cases. In calling attention to color *tattooing of the cornea*, Ziegler, of Philadelphia, presented an instrument with a ring to fix the limbus, and a smaller ring to mark off the pupil. He had also used an electric tattooing needle, which adds to the efficiency and precision of the procedure.

The pharomacodynamic analysis of *atropin* and *homatropin* by D. I. Macht, of Baltimore, seemed to show that the latter did not act like atropin, by paralysis of the oculomotor nerve endings; but in great measure by direct action on smooth muscle cells. The case of *oil cyst of the orbit*, reported by Arnold Knapp, of New York, showed yellow staining of the conjunctiva over the growth, which the writer thought characteristic of its nature. The Krönlein operation was done for removal of the cyst. A case of *tuberculoma* of the orbital cavity was reported by Dunbar Roy, of Atlanta, Ga. After exenteration of the orbit there was a good recovery and no symptoms after two years. Basal cell *carcinoma of the orbit and ethmoid* was reported by John Green, Jr., of St. Louis. A lesion on the bridge of the nose, 15 years ago, had healed after treatment with pastes. A nodule appeared on the lower margin of the orbit 7 years ago, and had only moderately increased. The growth had broken thru from the orbit into the ethmoid. The use of radium after operation caused severe reaction, and erysipelas was followed by perforation and shrinking of the eye.

From his studies of *accommodation* in 4000 eyes, Alex. Duane, of New York City, believes that the upper and lower

limits as well as averages of accommodation are fairly determined for different ages. In 500 subjects he studied both monocular and binocular accommodation and found the latter from 0.2 to 0.4 diopters the higher. He pointed out the practical importance of this in presbyopic subjects. He also found a range of true accommodation in advanced presbyopia.

Attention was called by the writer to *simple orthoptic training,* with "fusion tubes" and "fusion mirrors," which altho simple are capable of a wide variety of uses. P. C. Jameson, of Brooklyn, called attention to the *correction* of *squint* by an operation including tenotomy, recession of the tendon and its suture to the sclera. He found it safeguards convergence to a remarkable degree, and its corrective abilities are extensive and uniform. H. Friedenwald, of Baltimore, reviewed the subject of *exterior ophthalmoplegia* and reported cases.

In a paper outlining the place of *ophthalmology in the undergraduate curriculum,* W. G. M. Byers, of Montreal, provoked an active discussion of the subject, which showed a wide diversity of view, both as to how much and what parts of ophthalmology should, or could, be taught to medical students. H. H. McGuire, of Winchester, Va., reported a case of *retinal lipemia,* under observation for 3 months, with return of the fundus appearances to normal, altho the patient was not under good control. The fat content of the blood diminished from 8.6 to 3.5 per cent. A case of *retinitis proliferans,* due to the anemia of Hodgkin's disease, was reported by G. H. Bell, of New York City. Improvement of the general condition took place under treatment with sodium cacodylat. In a joint paper, H. F. Hansell and T. B. Schneideman, of Philadelphia, gave a general review of the subject of *luetic ophthalmitis.* W. B. Weidler, of New York City, reported a case of loss of the upper portion of the field of vision from *occlusion of the inferior retinal artery,* the branch of the central retinal artery most frequently affected.

W. E. Bruner, of Cleveland, urged the need for the same protection of the eyes in the *work shops of industrial schools,* as is being found necessary for the eyes of workman in machine shops. This should be attended to, both to remove the danger to the eyes in such places and for its educational value. John Rowan, of Glasgow, and others strongly supported this contention; and pointed out how the boys trained in such schools were likely to become foremen with many workmen under their supervision and care.

Technic for producing *experimental tuberculosis* in animals was described by W. C. Finnoff, of Denver. Injection into the common carotid artery is not difficult in rabbits. The use of a fine emulsion gave uncertain results. But by injecting a coarser emulsion containing clumps of bacilli, ocular tuberculosis was produced in every case.

At the opening of the Tuesday morning session, instruments and apparatus were exhibited; and a new feature was the *demonstration of one pathologic slide* each by five of the members, calling attention to its striking characteristics. The conditions shown were: Panophthalmitis following infection thru a cystoid cicatrix, by W. Gordon M. Byers, of Montreal, Canada. Sympathetic ophthalmia due to faulty trephining, by E. V. L. Brown, Chicago, Ill. Epibulbar carcinoma, by M. Feingold, New Orleans, La. Some changes secondary to sarcoma of the globe, by William C. Finnoff, Denver, Colo. Colloid bodies of the choroid, by Frederick T. Tooke, Montreal, Canada.

A case of *cyst of the iris,* in which a chemical and histologic study was made of the fluid it contained and of the cyst walls, was reported by A. Magitot, of Paris. These studies seemed to indicate that the fluid was secreted by the epithelial cells of the anterior layer of the iris, which formed a portion of the cyst wall.

The diagnostic and therapeutic *use of uveal pigment* in injuries of the uveal tract and sympathetic ophthalmia, was the title of a paper in which Arnold Knapp, of New York City, and Alan C. Woods, of Baltimore, presented a clinical and laboratory study of this subject. The immune reactions which follow in-

traocular injuries involving the uvea of the eye, were used in seventeen such cases as a diagnostic procedure. In eleven cases the complement fixation reaction was positive. These cases showed a normal healing without the occurrence of any sympathetic disturbance. Four cases showed negative reactions, and of these one showed clinically a malignant sympathetic ophthalmia, and three showed definite signs of sympathetic irritation. The two remaining cases showed negative reactions, and in these cases the injured eyes were enucleated as a precautionary measure. Three other cases of old sympathetic ophthalmia all showed negative reactions.

The one case of malignant sympathetic ophthalmia showed, in addition to a negative blood, a positive skin reaction to pigment vaccination. In this case uveal pigment was used as a therapeutic agent. The patient was first desensitized to pigment and then actively immunized, with apparently beneficial results. This case of sympathetic ophthalmia occurred in a boy, aged eight, after an operation for a perforated corneal ulcer with prolapse of iris after gonorrheal ophthalmia. The inflammation pursued a steadily progressive course, with all symptoms of sympathetic disease, notwithstanding every kind of treatment, diet, intestinal irrigations, pilocarpin, sweats and mercury inunctions, large doses of sodium salicylat, typhoid vaccination, and finally immunization with uveal pigment. The active process lasted for three months and has now been stationary for two months. Vision: 6/60. Peripheric retraction and flat total adhesion of iris; capsular opacities. Tension, normal.

The ocular manifestations in a case of *hypophyseal syphilis* in a woman of 24, reported by F. Phinizy Calhoun, of Atlanta, Ga., included: (1) Defective vision, her chief complaint, with choked disc. (2) Adiposity, gain from 190 to 225 pounds, since she was 18. (3) Polyuria. (4) Polydipsia. (5) Scant menstruation. (6) Bitemporal headaches. (7) Anaphrodisia. There were central scotoma and peripheral contraction of the visual fields. Blood and spinal fluid Wassermann tests were negative; but the ventricular fluid gave four plus. Treatment for syphilis by mercurial inunctions and salvarsan, caused general improvement and normal eyes.

Ben Witt Key, of New York City, reported a case of *hypophyseal disease probably syphilitic*. A man of 19 showed paralysis of left external rectus, inequality of the pupils, double choked disc and low grade retinochoroiditis. The laboratory tests were negative. Rigid antisyphilitic treatment relieved all symptoms.

H. M. Langdon, Philadelphia, reported the results of tests of *sugar tolerance* made on patients who had *cataract*, but who were not suffering from diabetes and were in apparently good health. A large proportion of these patients showed a strikingly low sugar tolerance. Many of the patients were old enough to be classed as suffering from senile cataract, but showed no other sign of senility. Two cases placed on suitable diet, and kept under observation, showed improvement.

Iris changes seen with the slit lamp, were described in a case reported by A. J. Bedell, of Albany, N. Y. There was an irregular partial *coloboma of the iris* ascribed to the use of forceps at her birth. The girl, now 13, also presented retained pupillary membrane, attached to the lens capsule, and high myopia. There was a mass of connective tissue fibers in many layers.

Diphtheria antitoxin in postoperative infections and in uveal disease was the subject of a paper by H. F. Hansell and G. Oram Ring, of Philadelphia. They reported a series of cases in which great benefit seemed to follow the administration of diphtheria antitoxin. Of the cases, four were postoperative, two of combined extraction and two of posterior capsulotomies. In one case there was violent inflammation following the entrance of a foreign body into the eyeball.

The *officers* of the Society, chosen at this meeting, were: President W. H. Wilmer, of Washington; Vice-President Alex. Duane, of New York; and Secretary-Treasurer, T. B. Holloway, of Philadelphia.

The general meetings of the *Congress of American Physicians and Surgeons,* held at Washington May 2 and 3, could not be regarded as particularly successful. This was partly because it was poorly announced. Probably the meetings of special societies composing the Congress were quite as well attended as usual. But the session at which the President of the Congress, Dr. Frank Billings, of Chicago, gave his address on "Present Day Problems Which Affect the Medical Profession and the Public" was not a large gathering. The other general session of the Congress was devoted to "Some Aspects of the Physiology and Pathology of Nutrition," presented by six speakers, who took the subjects of vitamines and diets in relation to various diseases.

A very enjoyable gathering of the week occurred Monday, May 1st, at the Madrillon Café, where about 35 gathered for a *dinner to Lt. Col. Fielding H. Garrison,* in recognition of his work in connection with the Library of the Surgeon General's Office and the Index Medicus. Col. Garrison has been ordered to the Philippines for two years and will go there late this summer. Prof. Wm. H. Welch, of Baltimore, spoke the words of appreciation for those present and for the larger number of those who would gladly have taken part if it had been planned to make the gathering larger. Col. Garrison briefly replied.

The triennial gatherings at Washington give many opportunities for pleasant contact and acquaintance with physicians and surgeons working in all the different fields of medicine. It would be a matter of regret if these were given up because of inadequate organization and announcement of the program prepared; and the lack of favorable arrangements for railroad travel, which were noticeable this year. E. J.

ABSTRACTS.

Wagenmann. Cystic Ectasia of the Tear Sac Caused by Air. Graefe's Arch. f. Ophthal. 105 Band, Festschrift fuer E. Fuchs, p. 401.

A case of ectasia of the right tear sac is described with cystic extension toward the lower lid, in a farmer aged 64 years, who for a long time had a cough and frequently had to blow his nose. He had noticed for the past ten or twelve years a tumefaction at the right eye, which gradually became larger. He could press the swelling away with his finger causing a whistling sound and easily cause it to reappear by blowing his nose. The swelling toward the nose occupied the site of the lacrimal fossa, was in size from a hazelnut to a walnut, and ended in a rounded apex above the internal ligament. The upper extension was of cherry size and went up into the lower lid, pushing the inner half of the lower lid border upward, causing a narrowing of the palpebral aperture. The ectactic sac was removed under local anesthesia, healing promptly.

H. A.

Marx, E. Eye Symptoms, due to Osteomyelitis of the Superior Maxilla in Infants. Brit. Jour. of Ophth., 1922, v, 6, p. 25.

Marx observes the lack in ophthalmic literature of notice of osteomyelitis of the superior maxilla, formerly known as acute sinuitis of the antrum of Highmore in new born infants. The condition is not of frequent occurrence, yet occasionally the symptoms lead to an oculist being consulted. During a period of nine years the author has observed three cases, the clinical histories of which he gives in detail.

As the result of a careful search of medical literature, he has been able to tabulate only thirty-five cases. The age range was from a few days to nine months; the eye symptoms were uniformly similar. Of the 35 cases tabulated, 30 developed eye symptoms, 5 were uncertain owing to incomplete case history. In 8, the eye symptoms first attracted attention. The results in 7 cases were unknown, 18 cured, while 10 died. As early medical attention improves the prognosis, it is important that the oculist recognize the disease quickly. Not in any of the series was the lacrimal sac involved. Exophthalmus was present in 10 of the cases.

As to the etiology, practically all writers are agreed that the condition must be attributed to bacterial invasion. The most probable point of entrance is the alveolar border. Assuming the presence of a small superficial abrasion, the female genital passages or breasts may be the source of infection. Careful bacteriologic investigation in the report of future cases will be required, as the tabulation shows that very little attention has been paid to this question. With invasion into the maxilla the bacilli develop further in the spongiosa of the bone, without the antrum of Highmore, which at birth is but very small.

Once the inflammation in the spongiosa has commenced, it goes further, just as in the osteomyelitis of the long bones. A heavy flow of blood to the inflamed parts sets in, followed by a discharge, and finally necrosis and sequestrum formation. If the matter has collected under the periosteum, this is pierced, and the inflammatory products can disperse in various directions.

The phenomena which the children show are mostly fever, lack of appetite, and sometimes disturbances of the bowels. Usually swelling of the eyelids soon appears, often a fistula in the region of the lacrimal sac, inflammation of the conjunctiva and sometimes exophthalmus, in addition to a frequent discharge of matter from the nose, swelling and fistulas of the alveolar process and the palate, falling out of the teeth, germs, and sequestration. These symptoms appear in the most irregular sequence and combination, and some, as for instance, discharge from the nose and canine fossa, continue for a protracted period.

If the children are sturdy, and treatment is commenced at once, the prognosis is usually good. From the fact that death followed in more than 25 per cent of the cases, one can deduce that these two conditions to a favorable result are not complied with.

The author's advice is for one to be as conservative as possible, and even in the commencement of abscess formation in the lower eyelid to make no incision in the abscess, as frequently treatment via the palate and alveolar process will effect a complete cure, while an ugly drawn scar with ectropion may result from incision.

D. F. H.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. T. W. Stallings, Tulsa, Oklahoma; Dr. Antonio S. Fernando, Manila, Philippine Islands; and Dr. Edward D. LeCompte, Salt Lake City, Utah. Volunteers are needed in other localities.

DEATHS.

Dr. P. K. Battle, Raleigh, N. C., died March 23, at Philadelphia, aged 63.

Dr. Duboys de la Vigerie, Secretary of the French Ophthalmological Society, died recently, aged 70 years.

Dr. H. Bert Ellis, Los Angeles, died at his home, April 15.

Dr. Eugenius A. Hildreth, aged 41, Wheeling, W. Va., died March 11th, from pneumonia.

Dr. Frank Herbert Jenckes, of Woonsocket, R. I., aged 51, died from heart disease at Buenos Aires, where he had gone for his health.

Dr. C. Pinkerton, Hastings, England, is dead at the age of 68.

Dr. W. A. Rape, Victoria, Texas, aged 57, died March 27th.

PERSONALS.

Dr. E. W. Tonkin, formerly of Edwardsburg, Michigan, has moved to Niles, Michigan.

Dr. Harold Gifford, of Omaha, Nebraska, has returned from his trip to British Guiana.

Dr. W. Grant Hatch, formerly of Rockford, Illinois, has moved to Santa Cruz, California.

A modern eye, ear, nose and throat hospital will be erected in Huntington, Va., by Dr. T. W. Moore.

Dr. W. W. Bennett and Dr. Fred G. Clark, formerly of Salt Lake City, have removed to Los Angeles to practice.

Dr. C. C. R. Pugmire, after study in Vienna, comes to Salt Lake City, Utah, to practice ophthalmology, rhinology, etc.

Dr. Emile Gallemaerts, of Brussels, who attended the Washington Congress, gave a series of clinics in New York City.

The Lucien Howe Prize of one hundred dollars has been awarded to Dr. A. J. Bedell, of Albany, N. Y., for an essay on "Cataract."

Dr. B. W. Egan, of Logansport, Indiana, has been elected one of the councillors of the Indiana Academy of Ophthalmology and Oto-Laryngology.

Dr. F. M. Fernandez, of Cuba, has been elected a member of the Academia de Ciencias of Habana. The subject of his address was "Hygiene of the Eye."

Dr. Wm. H. Merrill has been appointed specialist on eye, ear, nose and throat to a new subdistrict office of the U. S. Veterans', opened recently at Lawrence, Massachusetts.

Dr. Ernst Fuchs, Professor Emeritus of Vienna, whose visit to Baltimore was postponed by illness, gave a notable lecture on "Ophthalmology," at Osler Hall, March 29.

Dr. Fayette C. Ewing, formerly of St. Louis, now major-chief of the Eye, Ear, Nose and Throat Department of the U. S. Veterans' Hospital at Alexandria, Louisiana, has been elected president of the Rapides Parish (La.) Medical Society.

Professor Van Duyse, secretary since its foundation, was honored at the 25th anniversary of the Belgian Ophthalmological Society with an address delivered by Dr. Gallemaerts. Dr. Van Duyse also received the title of Commander of the Order of the Crown of Belgium.

Dr. Hiram Woods, of Baltimore, was the guest of honor at the January meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, and read a paper on "Impressions from Eye Examinations in Real or Supposed Psycho-Neurotics."

SOCIETIES.

The Section on Ophthalmology of the Philadelphia College of Surgeons elected Dr. McCluney Radcliffe, Chairman, and Dr. Charles R. Heed, Clerk.

At the annual election of officers of the Kansas City Academy of Medicine held in March, Dr. G. E. Bellows was elected president, Dr. J. S. Lichtenberg, vice-president, and Dr. J. W. Kimberlin, treasurer.

Col. R. H. Elliot, London, Ignacio Barraquer, Barcelona, and E. Gallemaerts, Brussels, were the guests of the Section of Ophthalmology of the New York Academy of Medicine on the evening of April 7.

The Kansas City Eye, Ear, Nose and Throat Society held its April meeting and dinner at the Hotel Muehlebach. Dr. S. Lewis Ziegler, of Philadelphia, was the guest of the evening.

The Ophthalmological Society of the United Kingdom of Great Britain and Ireland will hold its annual congress in London, May 11-13, when the Edward Nettleship prize will be awarded. Dr. T. M. Legge, medical inspector of factories, will read a paper on Industrial Diseases of the Eye.

The Tulsa Academy of Ophthalmology and Oto-Laryngology has recently been formed. The officers elected for the ensuing year are as follows: Dr. G. E. Hartshorn, president; Dr. J. H. Morgan, vice-president; Dr. Charles H. Haralson, secretary and treasurer.

The name of the Portland Ophthalmological and Oto-Laryngological Society has been changed to that of the Oregon Academy of Ophthalmology and Oto-Laryngology. Its meetings are held monthly on the evening of the third Monday. The officers elected for the ensuing year are: President, Dr. C. Gertrude French, The Dalles, Oregon; secretary-treasurer, Dr. Andrew J. Browning, Portland.

The Utah Ophthalmological Society, now in its fourth year, has a membership of forty, and excellent meetings are held on the third Monday of each month. It will have the pleasure this September of entertaining the Pacific Coast Oto-Ophthalmological Society. The president of the Utah Society is Dr. A. Ray Irvine, and its secretary-treasurer is Dr. F. H. Raley.

At the meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, April 20, papers were read by Col. R. H. Elliot, "Glaucoma Halos"; Dr. Ignacio Barraquer, "Operation for the Complete Extraction of Cataract," and by Dr. J. O. McReynolds, "Pterygium Operation."

The Puget Sound Academy of Ophthalmology and Oto-Laryngology held its annual banquet at the University Club, Seattle, Washington, February 3. The following officers were elected for the ensuing year: President, Dr. Frederick Ames, of Seattle; first vice-president, Dr. Daniel H. Bell, of Tacoma; second vice-president, Dr. Wm. H. Cameron, of Tacoma; secretary and treasurer, Dr. John H. Harter, of Seattle. Addresses were delivered by Drs. George W. Swift, Harry V. Würdemann, Clinton T. Cooke, Walter H. Seelye, of Seattle; and Drs. Ernest C. Wheeler and Wm. H. Cameron, of Tacoma.

A meeting of the Maine Eye and Ear Association was held in Augusta, February 1. An operative clinic was held at the Sisters' Hospital and was followed by a session at the Elmwood Hotel, where cases and case

records were presented by Drs. W. E. Kerschner, of Bath; E. E. Holt, of Portland; J. F. Hill, of Waterville; Oliver Turner, of Augusta; and F. T. Hill, of Waterville. After the dinner in the evening Dr. Frederick Verhoeff, of Boston, read a paper on "Clinical, Historical and Experimental Observations of Phacoanaphylactic Endophthalmitis."

The officers of the Pacific Coast Oto-Ophthalmological Society desire to announce that they are now preparing the program and completing other arrangements for the tenth annual session, which is to be held in Salt Lake City, Utah, September 14, 15 and 16, 1922. These days are chosen at a time when Salt Lake and its environs are unusually attractive, and being the week before the meeting of the American Academy of Ophthalmology and Oto-Laryngology at Minneapolis, September 19 to 21, will permit members to go from one meeting to the other. Contributions to the program should be addressed, at an early date, to the secretary, Dr. Edward D. LeCompte, Salt Lake City. He would like to hear from members who have pathologic specimens or other exhibits of interest for the session.

At the fifth annual assembly of physicians and pharmacists of the Philippine Islands, held February 6-10, 1922, under the auspices of the Colegio Médico-Farmaceutico and The Philippine Islands Medical Association, the Section on Ophthalmology, Otology, and Rhinolaryngology rendered the following program on the afternoon of February 7:

1. La Insensibilidad Corneal y la Extraccion de la Catarata. By Dr. C. Basa, acting chief of the Dept. of E. E. N. and T., of the University of Santo Tomas.
2. A Report of Three Cases of Tuberculosis of the Conjunctiva. By Dr. Felisa Nicolás, instructor, Dept. of E. E. N. and T., College of Medicine and Surgery, U. P.
3. Nueva Operacion de Catarata segun Tecnica Barraquer. By Dr. A. R. Ubaldo, professor and chief, Dept. E. E. N. and T., College of Medicine and Surgery, U. P.
4. Preliminary Report on the Causes of Blindness among Filipinos. By Dr. Antonio S. Fernando, assistant, Dept. E. E. N. and T., College of Medicine and Surgery, U. P.
5. Report on Three Cases of Retrobulbar Cellulitis. By Dr. Vivencio C. Alcantara, assistant, Dept. E. E. N. and T., College of Medicine and Surgery, U. P.
6. Relative Frequency of Eye, Ear, Nose and Throat Diseases among Filipinos as Observed in the P. G. H. By Dr. H. Velarde, assistant professor, Dept. E. E. N. and T., College of Medicine and Surgery, U. P.

MISCELLANEOUS.

It is reported that Topeka is having an epidemic of pink eye.

The New York Eye and Ear Infirmary was recently bequeather $10,000 by the will of the late James H. Ottley.

A bequest of $2,500 was recently made the Manhattan Eye, Ear and Throat Hospital by the will of Mrs. Julia Seligman. It was also given $5,000 by the will of the late Jonas M. Libbey.

The Bureau of Census estimates that there were 52,617 blind persons in the United States in 1920. The New England states had the greatest number, and the lowest amount was in the southwest central states; 15,000 of the foregoing numbers are blind thru industrial accident.

Under the auspices of the Federated American Engineering Societies a campaign to determine the extent of defective eyesight among children and industrial workers will be conducted thruout the United States, with the assistance of local health and educational officers, with the object of sight conservation. It is estimated that only one-third of the 24,000,000 American school children receive adequate tests of vision.

One class which has suffered much from high war prices is the reading blind, according to Miss Lucille Goldthwaite, who is in charge of the Library for the Blind, in the New York Public Library. Since the war the price of making the book with Braille alphabet has about doubled. In England, because of a fund which can be drawn upon, a fine class of books can be printed at comparatively nominal prices, 2s. 6d. per volume, and America for a long time was permitted to purchase at that price. Now we must pay 16s. a volume. The English have done excellent work for their blind. Wells' "Outline of History" was brought out for the sightless almost at the time it made its first appearance in regular type, and was one of the books that America made haste to purchase, the prices not having been raised until the last volume came out. Works by Galsworthy, Hardy and Conrad have also been brought out for the blind in England. The Library for the Blind in New York has more than 1,100 persons who use cards regularly, and 3,000 books a month are circulated. There are about a dozen magazines for the blind, most of them printed in England.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrations; (Pl) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 318 Majestic Building, Denver, Colorado.

DIAGNOSIS.

Candian, F. Peculiar state of refraction in diagnosis of retrobulbar tumors. Klin. M. f. Augenh., 1922, v. 68, pp. 195-199.

Gradle, H. S. Use of Gullstrand lamp. Trans. Amer. Acad. Ophth. and Oto-Laryng., 1921, pp. 126-135.

Knapp, P. Simple method for measurement of exophthalmos. Zeit. f. Augenh., 1922, v. 47, p. 213.

Lauber, H. Light filter for red free light. Klin. M. f. Augenh., 1922, v. 68, p. 226.

Noceti, A. Ocular refractometer. (1 ill.) Arch. de Oft. Hisp.-Amer., 1922, v. 22, pp. 90-94.

THERAPEUTICS.

Bargy, M. Milk injections in 3,000 patients. Clin. Opht., 1922, pp. 63-87.

Blanco, T. Sterilized milk in ocular therapeutics. Arch. de Oft. Hisp.-Amer., 1922, v. 22, p. 72.

Gotthardt. Roentgen therapy. Klin. M. f. Augenh., 1922, v. 68, p. 234.

James, R. R. Collosol argentum. Brit. Jour. Ophth., 1922, v. 6, p. 142.

Jonquieres, E. Tolerance of eye for radium. Rev. de la Asoc. Med. Argentina, 1921, v. 34, p. 1247. Abst. J. A. M. A., 1922, v. 78, p. 1351.

Junés. Aspiration puncture of vitreous and decompression. Clin. Opht., 1922, v. 26, p. 88.

Marui, S. Action of eserin and pilocarpin on human eye. (4 charts.) Klin. M. f. Augenh., 1922, v. 68, pp. 145-152.

Mayou, M. S. Collosol argentum. Brit. Jour. Ophth., 1922, v. 6, p. 186.

Naito, I. Action of atropin and cocain on human eye. (4 charts.) Klin. M. f. Augenh., 1922, v. 68, pp. 153-160.

Nicolich, M. Therapeutic dose of strychnin in ophthalmology. Arch. de Oft., Hisp.-Amer., 1922, v. 22, p. 132.

Oppenheimer, E. H. Afenil in ophthalmology. Klin. M. f. Augenh., 1922, v. 68, p. 232.

Richter, G. Action of homatropin on infant eye. Arch. f. Kinderh., 1922, v. 71, pp. 81-94.

Roe, A. L. Collosol argentum. Brit. Jour. Ophth., 1922, v. 6, p. 188 and p. 238.

Tobias. Local reaction in eye from protein therapy. Klin. Woch., 1922, v. 1, pp. 515-518.

Weill, G. Modification of technic of subconjunctival injections. Ann. d'Ocul., 1922, v. 159, pp. 192-194.

OPERATIONS.

Hileman, J. E. New knife needle. A. J. O., 1922, v. 5, p. 292.

Lang. Operating lamp. Royal Soc. Med., Sec. on Ophth., Jan., 1922. A. J. O., 1922, v. 5, p. 309.

Lanier, L. H. Postoperative complications in eye surgery. Texas State Jour. Med., 1922, v. 18, pp. 21-24.

PHYSIOLOGIC OPTICS.

Angelucci, A. Generation of esthetic sentiment. (12 ill.) Arch. di Ottal., 1922, v. 29, pp. 1-36.

Principles of optics. Deut. med. Woch., 1922, v. 48, p. 251.

Rosenhauch, E. Natural protective appliances and accommodation of eye. Polska Gaz. lek., Jan. 8-15, 1922, pp. 29-46. Abst. International Med. and Surg. Survey, 1922, April, p. 207.

Rossi, V. Vision by night. Arch. di Ottal., 1922, v. 29, pp. 80-88.

REFRACTION.

Belehradek, J. Experimental astigmatism in human eye from exhaustion of ciliary muscle. Casop. Lek. Cesk., 1922, v. 61, p. 81. Abst. International Med. and Surg. Survey, 1922, April, p. 223.

Brehmer, H. L. Headache from standpoint of oculists. Southwestern Med., 1922, v. 6, pp. 100-103.

Chance, B. Myopia with staphyloma verum. A. J. O., 1922, v. 5, p. 296.

Dean, F. W. Prisms, should they be prescribed for constant use? Trans. Amer. Acad. Ophth. and Oto-Laryng., 1921, pp. 108-119.

Greeff, R. Designation of meridians of astigmatism. (2 ill.) Klin. M. f. Augenh., 1922, v. 68, p. 224.

Henry, R. W. Myopia in infant. Brit. Jour. Ophth., 1922, v. 6, p. 218.

Hughes, F. A. Refraction of 76 midshipmen. U. S. Naval Bull., 1922, v. 16, p. 285. Abst. International Med. and Surg. Survey, 1922, April, p. 222.

Katsuraya, T. Examination of accommodation by lighted incense stick. Japan Med. World, 1922, v. 2, p. 118.

Marquez, M. Mechanism of skiascopy. Arch. de Oft. Hisp.-Amer., 1922, v. 22, pp. 65-72.

Peter, L. C. Composite astigmatic chart. A. J. O., 1922, v. 5, p. 307.

Raeder, J. G. Von Rohr's glasses and optical instruments. (1 ill.) Klin. M. f. Augenh., 1922, v. 68, p. 231.

Rowland, W. D. Changes in refraction in diabetes mellitus. Jour. Ophth., Otol. and Laryng., 1922, April, p. 145.

OCULAR MOVEMENTS.

Alcorn, J. G. Exact correction of strabismus. Eye, Ear, Nose and Throat Monthly, 1922, v. 1, pp. 110-114.

Brennecke. Point of rotation of eyeball. Klin. M. f. Augenh., 1922, v. 68, pp. 227-231.

Engelking, E. Cortical stimulation exciting unilateral vertical nystagmus. (chart.) Klin. M. f. Augenh., 1922, v. 68, pp. 50-73.

Folinea, G. New apparatus for measurement of heterophoria. (8 ill.) Arch. di Ottal., 1922, v. 29, p. 48.

Freeman, W. Paralysis of associated lateral movements of eyes. Arch. of Neurol. and Psychiat., 1922, v. 7, pp. 454-488.

Ginestous. Infantile ophthalmoplegia. Bul. de l'Acad. de Med., 1922, v. 87, p. 326.

Goar, E. L., and Ralston, W. Ocular muscles. Texas State Jour. Med., 1922, v. 18, pp. 31-33.

Hunter, R. J. Disease of otolith apparatus (nystagmus). J. A. M. A., 1922, v. 78, pp 1380-1383.

Jackson, E. Orthoptic training. A. J. O., 1922, v. 5, p. 322.

Evolution of binocular vision. A. J. O., 1922, v. 5, p. 323.

Knapp, P. Treatment of tenotomy after Kuhnt. (bibl.) Zeit. f. Augenh., 1922, v. 47, pp. 208-212.

Miller, E. B. Exhibition of muscle indicator. (dis.) A. J. O., 1922, v. 5, p. 306.

Minkowski, M. Anatomic conditions for binocular vision. Encephale, 1922, v. 17, pp. 65-97. Abst. J. A. M. A., 1922, v. 78, p. 1425.

Parker, F. C. Facial palsy. (dis.) A. J. O., 1922, v. 5, p. 296.

Posey, W. C. Muscle advancement operation. Trans. Amer. Acad. Ophth. and Oto-Laryng., 1921, pp. 83-90.

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LIPEMIA RETINALIS: REPORTS OF THREE CASES.

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These cases occurring in the Mayo Clinic and reported by a Fellow in Ophthalmology of the Mayo Foundation, confirm the view that ophthalmoscopic changes arise when the fat in the blood exceeds four per cent, and quickly disappear when it falls below that proportion. In one of the cases the increase of fat in the blood attended a lymphatic leukemia, and the appearance of the fundus was modified by that disease.

Since so few cases of lipemia retinalis have been observed accurately even by ophthalmologists and internists of large experience, it seems advisable to place on record as many single cases as possible in order to provide ultimately a sufficient number for interpretative study. Three cases recently observed in the Mayo Clinic are herewith reported:

Case 1 (A371647). Mr. C. E. A., aged twenty-six years, was admitted to the Clinic, September 9, 1921, in incipient diabetic coma. He had had, since June, 1921, severe diabetes mellitus which had not yielded to moderate dietary restriction.

The urine contained 3.8 per cent sugar and large amounts of acetone and diacetic acid. The plasma carbon dioxid capacity was 21.7 volumes per cent. The blood contained 0.425 per cent sugar and 8.2 per cent fat.. The systolic blood pressure was 110 and the diastolic 85. There was moderate peripheral arteriosclerosis.

Examination of the fundi revealed the characteristic picture of lipemia retinalis. The optic discs were waxy in apearance and their margins well defined. The caliber of the retinal arteries appeared somewhat narrower than normal. On the disc the arteries were a very pale salmon pink, the color fading rapidly as the vessels grew smaller so that the arteries became practically white at a short distance from the disc. The veins on the disc were of a light chocolate hue, gradually becoming paler toward the periphery, so that the smaller venules were indistinguishable from the arterioles. There were no retinal or choroidal lesions. Two days later the appearance of the fundus had changed markedly. The arteries were nearly normal in color. The veins were still somewhat chocolate colored, but were easily distinguished, even the finer branches. The disc remained waxy in appearance. Examination of the blood showed that the percentage of fat had fallen to 4.08 per cent.

The patient was dismissed from the hospital twenty-four days after admission. The percentage of fat in the blood had fallen to 1.9 per cent and the fundus was entirely normal. The urine did not contain sugar; the blood contained 0.11 per cent sugar.

The most interesting feature of this case, from an ophthalmologic standpoint, is the conformation in one patient of Heine's conclusion (based on his findings in two patients), that, when the fat in the blood reached 4 per cent, the lipemia was suggested by the appearance of the retinal vessels; it became definitely recognizable when the percentage of fat rose to 8 per cent. The appearances of the fundus on the second examination in Case 1, altho suggestive of lipemia retinalis, were certainly not definitely diagnostic; the first picture on the other hand was unmistakably characteristic, the diagnosis being confirmed independently by the chemical examination of the blood. From a medical standpoint, it is interesting to observe that in this case the patient's acidosis and lipemia cleared up without starvation but on a diet relatively high in fats.

Case 2 (A381055). H. C. W., a boy, aged nine years, was brought to the Clinic January 6, 1922, because of dyspnea, and a large mass in the right side of the neck. He had had influenza and parotitis at the age of six, and pertussis and chicken pox at seven. Tonsillectomy and adenoidectomy had been performed when he was four years of age, and circumcision when he was six. Since his second year, he had had recurring attacks of asthma and hay fever, occurring during the latter part of August. Three weeks before examination, the glands on the right side of the neck began to enlarge rapidly. One week later, his face became puffy and in a few days labored breathing began.

Objectively, there were multiple small petechiae on the face, neck, chest, and upper extremities and a few purpuric areas on the arms and neck. There were multiple coalescent nodular masses in the right cervical, supraclavicular, and infraclavicular areas, and slight glandular enlargement in the left cervical, the axillary, and the inguinal regions. In the chest, was an area of dullness 11 cm. in diameter at the second interspace, extending downward from the suprasternal area and blending with that at the base of the heart. This was interpreted as an enlarged thymus combined with an adenopathy affecting the tracheobronchial lymph nodes. The spleen was felt 4.5 cm. below the costal margin and the liver 6.5 cm. below. Roentgenograms of the chest showed marked mediastinal thickening, probably glandular. The urine contained a trace of albumin and an occasional pus cell; the specific gravity was 1.018. Hemoglobin was 61 per cent, erythrocytes 3,160,000, and leukocytes 51,200, with a very marked predominance of lymphocytes.

A tentative diagnosis of lymphatic leukemia was made; and two days after admission, and again a week later, radium was applied to the involved areas. The glandular enlargements and the mediastinal mass decreased rapidly, and the liver and spleen also became smaller. There was considerable variation in the leukocyte count, ranging on different days from 6,200 to 24,000. The differential count three weeks after admission showed mature lymphocytes 8.6 per cent, immature lymphocytes 79.2 per cent, mast cells 0.4 per cent, neutrophils 7.8 per cent, eosinophils 0.2 per cent, myelocytes 0.2 per cent, and normoblasts 3 per cent. The anemia gradually became more marked and nineteen days after admission the hemoglobin was 31 per cent, and the erythrocytes 1,900,000.

Because of the variability in the blood counts, ophthalmoscopic examination was made with the idea that the presence or absence of a leukemic retinitis might aid in establishing diagnosis. Nineteen days after admission, the fundi were first seen. The discs were waxy in color and somewhat blurred as if from slight edema. The arteries and veins appeared ribbon like; they were practically indistinguishable except on and near the nerve heads, and were almost white. The larger choroidal vessels were easily visible and were of a light yellowish tinge. The smaller retinal vessels could not be seen against this background. There were a few scattered retinal hemorrhages.

The picture differed markedly from that ordinarily seen in leukemia, and comparison with cases of pernicious anemia with even lower hemoglobin percentage demonstrated that the appearance of the retinal vessels could not be caused by anemia alone. The diagnosis of lipemia retinalis was made by exclusion. The blood drawn twenty-four hours later, showed, on standing, the characteristic creamy serum, in which the microscope revealed fat globules. Chemical analysis yielded 5 per cent total blood fat. Two days after the retinal lipemia was noted, the patient was transfused with 500 c.c. of citrated blood. The next day, the retinal blood showed a return of color, the whitish appearance being visible only in the smaller vessels which could now be traced well to the periphery. On the fifth day after the original observation, the retinal lipemia had practically disappeared. The hemoglobin was 55 per cent, the erythrocytes 3,340,000 and the

leukocytes 8,800. The differential count was lymphocytes, 93.5 per cent, polymorphonuclear neutrophils 5.5 per cent, large mononuclears 0.5 per cent, eosinophils 0.5 per cent, and nucleated red cells, 0.5 per cent. Total blood fat was not again determined. The patient was dismissed on the sixth day.

There is some doubt with regard to the factor leading to the lipemia, and of the bearing of the lipemia on diagnosis and prognosis. There was no sugar in the urine and the specific gravity was constantly low. It is possible that the rapid destruction of tissue produced by the radium may have resulted in temporary overloading of the blood with lipoid substances. The possibility of the occurrence of lipemia in rapidly developing anemias is suggested by the experimental work of Boggs and Morris on lipemia in rabbits. The subject is certainly worthy of further investigation. It seems most probable that the failure to observe lipemia retinalis usually has been owing to its transitory appearance rather than to its rarity.

Case 3 (A385906). H. S., a girl, aged ten years, was brought to the Clinic April 9, 1922, because of polydypsia, polyuria, loss of appetite, and loss of weight and strength. Shortly after the appearance of her symptoms fifteen months before, urinalysis had revealed the presence of sugar, and for about a year, she had been on a qualitatively restricted diet without improvement.

Examination of the eyes showed vision 6/5 in each eye, slightly unequal pupils with normal reflexes, and no external ocular lesions. Examination of the fundi revealed a picture fairly characteristic of lipemia retinalis. The optic discs were waxy in appearance. The retinal arteries were pale salmon pink on and near the discs, while the finer branches were practically white. The larger retinal veins were of a chocolate hue and the smaller venules were creamy white, but still distinguishable from the arterioles. The diagnosis was confirmed on venipuncture, as, after centrifugalization of the blood, the serum had the opaque creamy appearance typical of lipemia. As is usually true when the blood fat is high in diabetes, this patient was on the verge of coma. She was quite drowsy at the time of examination. The urine contained 4 per cent sugar, some acetone, and diacetic acid. The plasma carbon dioxid capacity was 21 volumes per cent. The blood contained 0.40 per cent sugar and 3.5 per cent fat. The hemoglobin was 75 per cent and leukocytes 8,200. It is probable that the actual fat content of the blood was higher than here reported, as unfortunately the blood had clotted before the estimation was undertaken and it was impossible completely to extract the lipoid substances.

This patient is still under observation and in fair condition, altho her urine still contains 0.6 per cent sugar on a very limited diet. The retinal lipemia was as usual very transitory. It was much less noticeable in two days, and it had completely disappeared within a week. The fundi have since been normal on repeated examinations. The blood fat has not again been determined.

In the cases heretofore reported the lipemia giving rise to the characteristic retinal picture has been an incident in the course of severe diabetes mellitus. According to Moore, "Lipemia is described as occurring in a number of widely differing diseases, for example, chronic alcoholism, phthisis, asphyxia, nephritis, phosphorus poisoning, pneumonia, peritonitis, gout, starvation, and diabetes. I have, however, been unable to discover any reported case where lipemia retinalis was observed, except where diabetes was the cause." The impression is gained from text books and case reports that it is only in diabetes mellitus that the fat content of the blood rises above the 4 per cent requisite for its recognition in the retinal vessels. That this is not necessarily true is shown by the findings in our second case.

I have been able to collect in the literature seventeen cases of lipemia retinalis. As an aid to further study I have tabulated the essential features in

these cases, including age, sex, percentage of blood fat, and length of life after observation of the lipemia. Since recent investigators have not determined such high blood fat values, the accuracy of the data of Reis, Fraser, and Koellner would seem to be open to question.

TABULATION OF TWENTY CASES OF LIPEMIA RETINALIS:

Author, Year.	Sex, Age	Blood fat, per cent	Length of life after observation.	Remarks
Heyl, 1880	M—20	Microscopic examination only	Forty-four days	.....
White, 1903	M—26	Microscopic examination only	Living three months after	Lipemia retinalis disappeared in two months. Microscopic findings stated as albuminous granules, not fat.
Reis, 1903	M—28	18.129	Ten days	.....
Fraser, 1903	M—17	16.5	Twenty-four hours	.....
Heine, 1906	M—17	8.65	Six days	Blood fat taken six hours before death.
Heine, 1906	M—*	4.0	A few hours	Slight picture, only definitely diagnosed because of change from previous normal findings.
Turney and Dudgeon, 1906.	F—35	Microscopic examination only	Seventeen days	.....
Marx, 1907	M—*	7.5	Four months	.....
Hertel, 1909	.....	.....	.....	No data except that the patient was young, diabetic, and died.
Koellner, 1910	M—25	26.25	Nine weeks	Fundus picture less marked after blood fat dropped to 13 per cent.
Darling, 1912	M—48	Large amount	Six weeks	.....
Moore, 1915	M—23	Not stated	Twenty-four hours	.....
Moore, 1915	F—25	Not stated	Twenty hours	.....
Moore, 1920	M—25	Not stated	Six weeks	Plasma of blood in sections stained with Sudan III.
Cohen, 1921	M—14	8.95	Twenty-four hours	.....
Hardy, 1921	M—29	9.50	Living after one month	Fundus normal in two weeks. Fat in blood 2.9 per cent six days after first observation.
Williamson, 1921	M—26	Not stated	Not stated	.....
Wagener, 1921	M—26	8.2	Living after one month	Retinal lipemia had diminished in two days, when the blood fat had fallen to 4 per cent, and had disappeared in three weeks, when the blood fat was 1.9 per cent.
Wagener, 1922	M—9	5.0	Seven days	Retinal lipemia had practically disappeared in five days.
Wagener, 1922	F—10	3.5	Living after two months	Retinal lipemia had disappeared in a week.

*Not stated.

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SOCALLED SOLID EDEMA; LYMPHOMA.

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Two cases are here reported in which the histologic diagnosis of the removed tumors was lymphoma. One under observation for 9 months and classed as a solid edema, was circumcorneal and apparently benign; the other affected the lid, ultimately recurred, and the patient died after four years from laryngeal and pulmonary lesions. Read before the American Academy of Ophthalmology and Oto-Laryngology, October, 1921.

Solid edema, an ill defined term, has seldom been applied to an eyeball lesion, so there is very little in the literature in reference to the condition. The common understanding of the disease is a recurring swelling with redness. The example that we place before you is of an entirely different type.

Mrs. L. D., age fifty-two years, an American born housewife, first complained of trouble wih her right eye in August, 1919. A slight redness appeared on the inner side of the eyeball which increased in size. This injection appeared after a motor trip, when the eyeball pained badly and the patient felt ill for some days, with a little puffiness of the eyelids in the morning and some sensation of a foreign body in the eye. Most of her discomfort disappeared after the use of hot compresses, but the redness and swelling steadily increased. Thru the kindness of Dr. A. W. Sylvester, I saw the patient on August 5, 1920. See Plate VI.

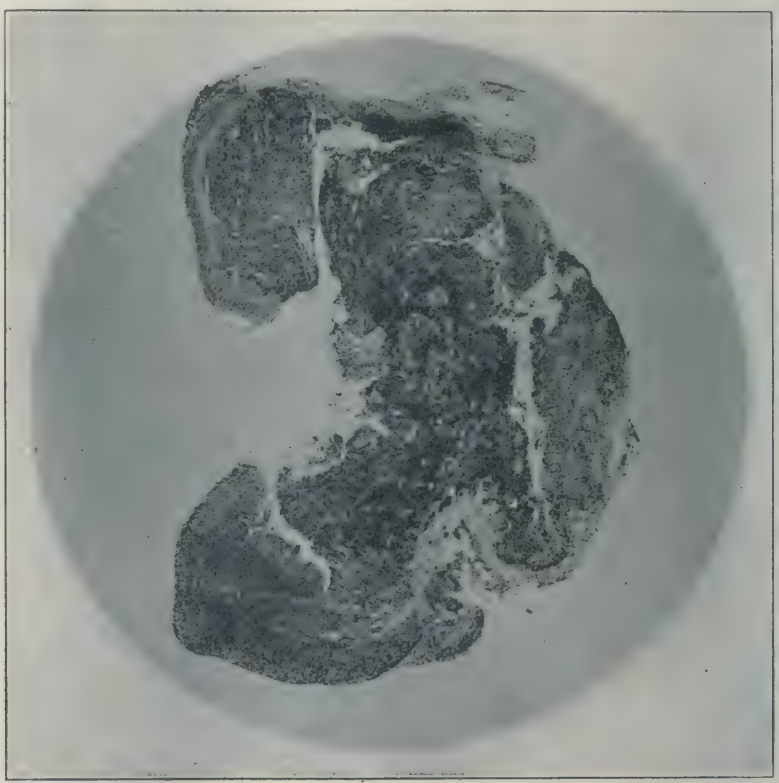

Fig. 1.—Case 1. Superficial mass showing conjunctival surface and tumor. 62.5X.

The vision of the right eye was 20/40, cornea clear, pupil 4 mm., regular, active, with no alteration in the color or consistency of iris. The media were clear, and the disc distinctly outlined without abnormality of pigment or vessel distribution. No change in

A Case of "Solid Edema". Lymphoma—Dr. Bedell

A Rounded, Elevated, Peri-Bulbar Mass Extending from Limbus Backward Fading into the Surrounding Tissue. The High Light Represents the Definite Edematous Appearance of the Growth

the retina or choroid, so that the entire lesion was extraocular and occupied a position mainly to the nasal side of the globe. This pericorneal mass was 14 mm. wide and about 5 mm. thick. It was round, pink and edematous looking, and extended from a point about opposite the insertion of the superior rectus around the globe to the temporal side of the inferior rectus. The conjunctival vessels passed over the tumor without increased tortuosity and were only slightly enlarged in caliber, altho more numerous and on pressure easily compressed. The tumor lay beneath the conjunctiva, was firm to pressure, immobile with a smooth margin which faded into the surrounding tissue, except at the limbus where the conjunctiva bulged to cover the mass.

The left eye: vision 20/70, pupil 4 mm., regular, active, media clear, disc without change, but in the macular region a lattice like, irregularly rounded area, one disc diameter in size, of pigment absorption and deposits.

When a child the patient had scarlet fever and measles and has always been susceptible to "cold;" once had an abscess of her eyelid, and once an abscess of her throat. At twenty she had a nervous breakdown, but since that time has had no recurrence. Has one living child and has lost none. She has had no injury or constitutional infection of any kind. She has never spent any long period in a tropical country, and has never had any intestinal upset or malaria.

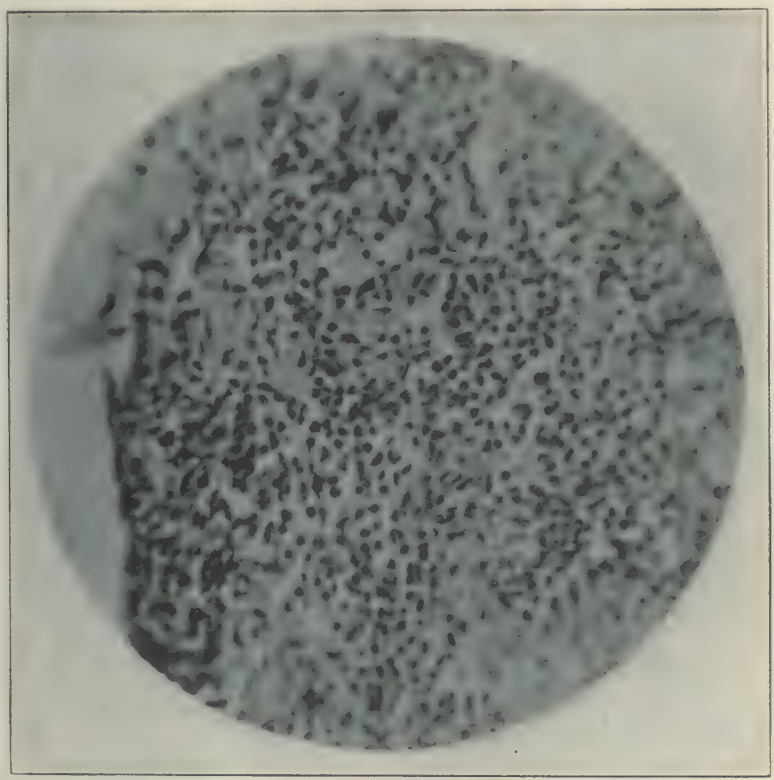

Fig. 2.—Case 1. Nuclei large, oval, granular eccentric. 600X.

To determine the nature of the mass, the patient was admitted to the Albany Hospital, where the blood Wassermann was found to be negative. The urine and stool were also negative. Subcutaneous injections of old tuberculin caused no local, general or focal reaction. Three teeth were found to have apical abscesses and were removed,

and the patient given hexamethylenamin and increasing doses of potassium iodid.

After having been under observation four months, it seemed that there was a positive increase in the growth. On the 10th of December, under cocain anesthesia, the Shahan thermophore with the 5 mm. tip was placed over the superior margin of the mass with a temperature of 156° for one minute. The application had no effect. Because of the smooth margin, taken in conjunction with the other findings, the patient was told that probably the mass was a firm edema. The growth was slightly larger, but there was the thought that it might be malignant and, therefore, I hesitated, for fear of making conditions worse, to take a piece for microscopic study.

On February 2, 1921, the patient was seen by Dr. George E. de Schweinitz who considered the condition one of the socalled solid edemas, and felt that the mass was probably not malignant. At this time all the perinasal sinuses were negative physically and by X-ray.

Some months later, May 7th, the patient again entered the Albany Hospital, and a small piece of the tumor was removed, which Dr. Ellis Kellert reported as probably not malignant, a lymphoma. On the 25th of May, under ether, a conjunctival incision was made 3 mm. from the limbus, extending from above down to the inferior rectus. The conjunctiva was easily separated from the growth. At no place did the conjunctiva seem to enter into the mass. However, the tumor encircled the internal rectus and inferior rectus, so that it was necessary to dissect it carefully from the two

Fig. 3.—Case 2. Showing enlarged mass on everted lids.

muscles. Altho somewhat adherent to the sclera, it did not penetrate deeply. When removed, the tumor was soft and friable. There was very little bleeding, but the conjunctiva tore so easily that ordinary sutures would not hold, therefore, two traction sutures were placed across the cornea. The healing was uneventful. Conjunctival

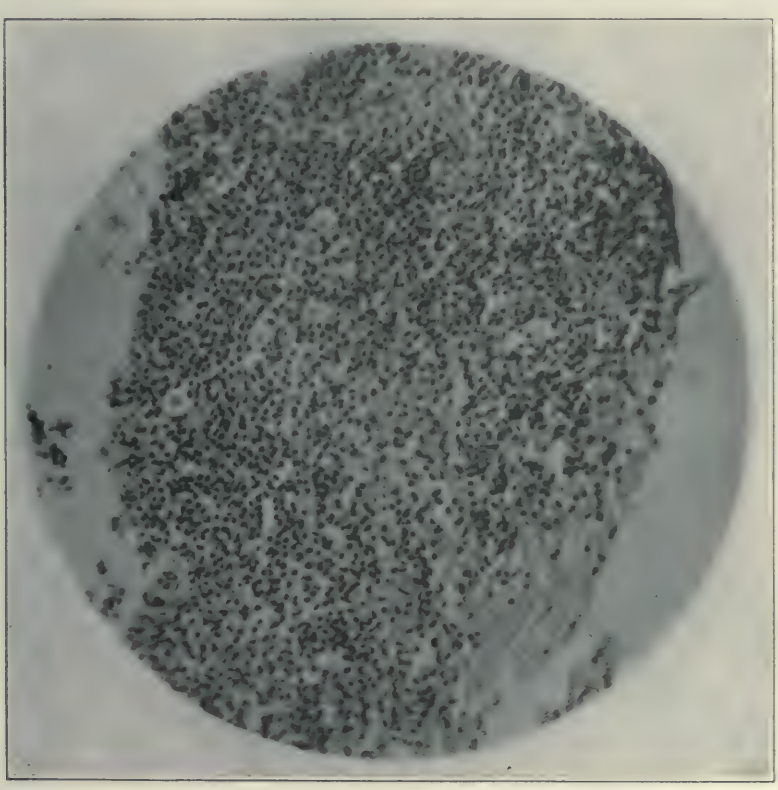

Fig. 4.—Case 2. Nuclei deep staining, uniform in size and shape, rounded. 350X.

apposition is excellent and the only point where vascularization persists is at the side of the preliminary tumor dissection.

The tumor mass proved to be a true lymphoma, consisting chiefly of lymphocytes and some connective tissue strands. The walls of the capillaries and blood vessels were intact.

Bacteriologically nothing had been developed. No organisms were found in the growth, and the parts implanted in rabbits and guinea pigs have failed to cause the death of any of the animals, and now at the end of several months, there is no evidence of tumor formation. The one guinea pig killed showed no evidence of tuberculosis.

It is well known that the follicles of the conjunctiva may proliferate in such a way that great masses of true lymphoid structure are found. As far as we know, there is no record of a mass growing on the eyeball of this size that has proved to be lymphomatous.

In comparison with the case just cited is that of Mr. G. B., age sixty years, who was first seen January 3, 1910, giving a history of irritation as of something in the left eye for two months, during which time there had been some lacrimation with slight secretion in the morning. The eyelids were decidedly thick with entropion of the lower lids as a result of many large firm, greyish pink masses. These swollen areas were tense, firm and round. In the upper cul de sacs, ex-

tending from the cartilaginous border, were masses, the largest of which measured 3.5 mm. by 1 mm. These masses were removed and on examination proved to be lymphoma, which later, however, took on certain changes so that the diagnosis was made of lymphocytoma, lymphoblastoma, lymphosarcoma and malignant lymphoma.

Despite a very careful removal of all the diseased tissue, there were recurrences with extension first showing itself as a mass on his upper lid and extending from there to the glands of his neck and deep into the orbit, but extending in such a way that there was no proptosis, but an extension of growth back from the lids themselves. After being under observation four years, the patient went to bed August 20, 1914, and died September 21st of the same year, as a result of edema of the lungs following laryngeal spasm. For months before his death it was with great difficulty that he could speak.

Histologically, the tissue was lymphoid in character with no suggestion of lymphoid follicles and germinal centers. The individual cells closely resembled the normal lymphocytes, and occasionally, similar but larger cells resembled lymphoblasts. Mitotic figures were present but not numerous. The stroma was scanty, the blood vessels abundant and fairly well developed.*

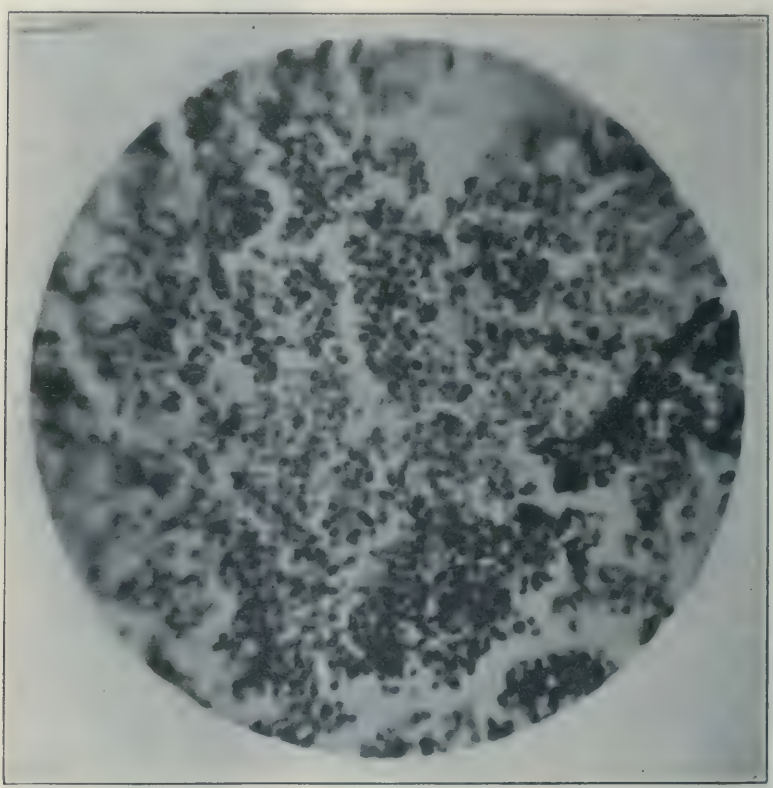

Fig. 5.—Case 2. Nuclei deep staining, rounded. Some nuclei granular oval, showing cytoplasm. 600X.

It is hoped by the careful consideration of these two cases that others may record their observations and something new be gained.

*Photomicrographs and sections were made under the direction of Dr. Anton S. Schneider.

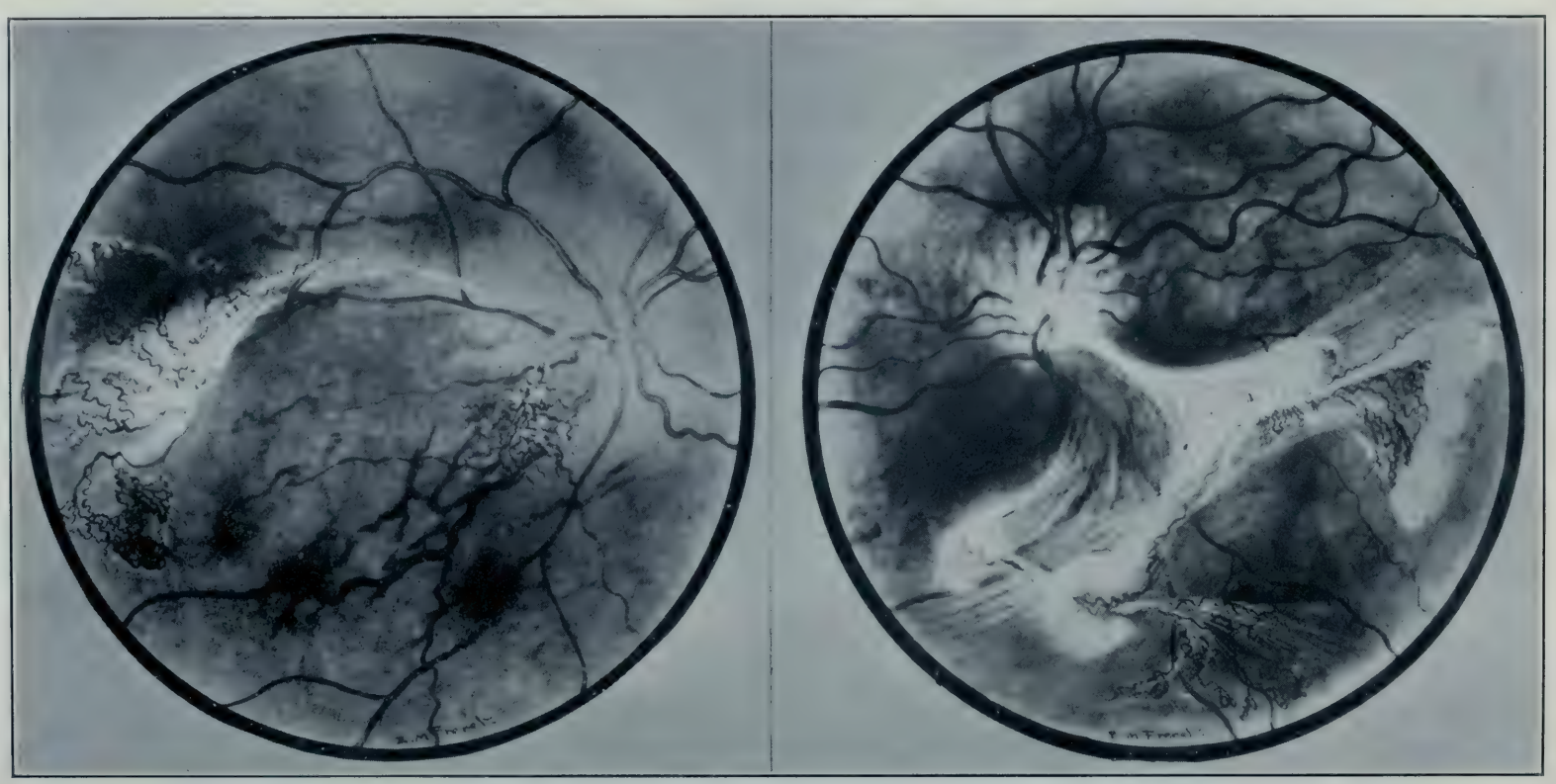

FIG. 1. RIGHT EYE

FIG. 2. LEFT EYE

RETINITIS PROLIFERANS WITH HODGKIN'S DISEASE. (BELL'S CASE).

RETINITIS PROLIFERANS FROM ANEMIA PRODUCED BY HODGKIN'S DISEASE.

GEORGE HUSTON BELL, M.D., F.A.C.S.

NEW YORK CITY

The case here reported began two years before with swelling in the glands in the neck and failing vision, said to be due to retinal hemorrhage. The ophthalmoscopic appearances found are reproduced in Plate VII. Read before the American Ophthalmological Society, May, 1922.

This patient was seen by the members of the Eye Section of the New York Academy of Medicine on May 16, 1921. Retinitis proliferans is seen so rarely, and the subject is so interesting, that I think this case of mine warrants publication, as the etiology points to Hodgkin's disease, from which the patient has been a sufferer for the last two years.

J. G., age 24, Federal Board student, was first seen by me at the U. S. P. H. Hospital No. 38 (New York Polyclinic) on January 2nd, 1921. He was complaining of poor vision, insomnia, nervousness, shortness of breath and some difficulty in swallowing at times. He gave the following history: Twenty months previously he had been treated in the Army Hospital (Camp Dix) for Hodgkin's disease. The treatment consisted of six injections of neosalvarsan, also he had Roentgen ray treatment to the enlarged glands every week for ten weeks. Two years ago, when he first noticed the swelling of the glands in the neck, his vision began to fail. At that time a diagnosis of retinal hemorrhages was made.

Status Praesens: Weight now 130 pounds, two years ago 165. The examination revealed enlarged lymphatic glands on both sides of the neck and in both axillary regions. He also complained of sore throat, and both ankles were swollen and had been for the last three weeks. Patient had a marked bronzing of the skin. The conjunctivae of both eyes were congested. An inequality of the pupils was observed in this case, which I think was due to pressure of the glands on the cervical sympathetic. Also there was some edema of the eyelids. Vision R=20/30; L=20/100. The dimness of vision in R. progressed more rapidly than in L.

The fundus of each eye presents a beautiful picture, and one that is seldom seen. (See Plate VII.)

The fundus of O.D. presents a large, shiny white mass in the temporal portion of the retina, extending anterior to the equator. This mass of connective tissue membranes projects out into the vitreous, and is covered with blood vessels, which look like arterial twigs. They spring from this mass and extend forward beyond the limits of the ophthalmoscopic field. From this big mass a thin membrane passes back and is attached to the disc. About two millimeters below the papilla, there is a new formation which is covered mostly by blood vessels. A thin membrane of connective tissue also connects this new formation with the disc. Nearly all these sheets of connective tissue in retinitis proliferans, according to Oatman, are attached posteriorly to the papilla.

The vascular changes in O.S. are more pronounced. There are four solid masses of connective tissue which extend out from the retina into the vitreous, two of which are covered with adventitious blood vessels. One of these masses takes in a portion of the macular region. These masses are greyish white in color, very dense and thick. They are immovable and do not float about in the vitreous when the eye is moved. These membranous opacities in the left eye widen out fan-wise towards their anterior attachment. There is a thin veil of connective tissue that connects all four of these solid masses, also there is a broad band of connective tissue which unites the largest of those masses to the papilla. In this eye as well as in the right, there seems to be an anastomosis of the arterial and venous circulation in these new formation blood vessels.

General Examination: His urine was normal. The Wassermann tests—spinal and blood were negative. Also the tuberculin test was negative. Blood pressure; systolic 128, diastolic 80. X-ray of chest was negative. Looking him over for the "Three T's" (Teeth, Tonsils and Toxemia), the X-ray of the teeth was negative. The tonsils were diseased and enlarged—in fact, he complained of a sore throat when first seen. Report of blood examination showed marked secondary anemia. R. B. C. 1,380,000—W. B. C. 7,000; hemoglobin 60%, polynuclear 70%, small mononuclear 25%, eosinophils 5%. Examination of heart, lungs and abdomen were also negative. The tongue was heavily coated and his breath was bad, which showed some hidden source of toxemia. The odor of the breath is often a significant index of the blood condition. Offensiveness of the breath is always to me suggestive of toxemia.

Etiology: The exact cause of Hodgkin's disease is unknown. A tonsillitis may precede the onset, enlargement of the cervical glands is usually an initial symptom. Evidence points to an acute infection which gains its entrance to the cervical glands thru mouth, nose or throat. The infection produces a chronic toxemia and a vitiated blood supply, which produces the secondary anemia.

With a blood count like we have in this case it is very easy to say that some form of vascular degeneration may be assumed. All authors regard hemorrhage as an essential preliminary in the formation of retinal membranes.

Treatment: The patient was admitted to the U. S. P. H. Hospital No. 38. He was given 3 grains of sodium cacodylat hypodermatically daily for three weeks. At the end of three weeks the patient had improved so much, that we thought it advisable to enucleate his tonsils. The injections of soda were continued and at the end of 6 weeks his blood count was as follows: R. B. C. 4,840,000, W. B. C. 5,600, hemoglobin 85%, poly. 67%, small mon. 31%, large mon. 2%. His blood picture showed a marked improvement and he had gained 30 pounds in weight. All the time he was in the hospital I had him on my "Reform Diet", which consists of not mixing heavy starches and proteids at the same meal. In this age of abundant starch and imperfect mastication, the stomach and intestines are flooded with undigested starch which may give rise to many evils, such as acid dyspepsia, and toxemia, and especially is this true when heavy starches and proteids are eaten together at the same meal.

After eight weeks stay in the hospital, the patient was discharged much improved in body and spirits. The swelling of the glands of the neck and axilla had completely disappeared. The vision remained the same, but he was able to resume his work as a Federal Board Student.

In these obscure cases, would it not help matters materially if we would adopt measures, such as a "Reform Diet" and the systematic removal of all forms of foci of infection?

I wish to express my thanks and appreciation to Doctor Joseph Israel and Doctor A. Cohen of the Public Health Service for their assistance and cooperation in the treatment of this most interesting case.

INTRAOCULAR FOREIGN BODY OF FORTY-SIX YEARS' DURATION.

WALTER SCOTT FRANKLIN, M.D., F.A.C.S., and FREDERICK C. CORDES, M.D.

SAN FRANCISCO, CALIFORNIA.

The case here reported showed remarkable tolerance of copper within the eye, but there was ossification and sympathetic irritation of the fellow eye requiring enucleation. Contributed from the Department of Ophthalmology, University of California Medical School.

In reporting this case, we feel that the duration of forty-six years is of sufficient interest to warrant its presentation. A consideration of intraocular foreign bodies, especially of copper, is included.

The literature is replete with case reports of foreign bodies which at varying intervals have caused the removal of the eye thru late inflammatory reaction. Quoting de Schweinitz[1]: "Foreign bodies may be tolerated for long periods of time—but can never be trusted."

Mr. F. C. B., age 58, reported to us from Oroville, California, on January 12, 1922, complaining of an inflamed, swollen left eye which was extremely painful. He gave the following history:

At the age of 12, while hitting a percussion cap with a hammer, it exploded and struck him in the left eye. The eye was badly inflamed for a number of weeks and has been blind since the accident. Does not know if foreign body is present, as he has not had an X-ray examination. The eyeball was quiescent until four months ago when it flared up for a short time. During this period the good eye was sensitive to light. Since then, at varying intervals, the injured eye has become slightly inflamed. The last two weeks, and especially the last few days, the condition has become more marked and, in addition, has become progressively painful, so that patient was unable to sleep. For the past two days, the right eye has been troublesome, being sensitive to light.

Examination: R. V. .8, with correction 1.0. L. Amaurotic.

R.: Pupil contracted, reacts slowly to light, otherwise external examination negative. Fundus negative. L.: Marked edema of both lids with blepharospasm and excessive lacrimation; extreme ciliary injection. Cornea edematous with whitish concretions and a leucoma adherens. Anterior chamber abolished. No light reflex. Tension ++. X-ray examination showed an intraocular foreign body, together with ossification. The diagnosis was iridocyclitis of the left eye due to retained intraocular foreign body, together with sympathetic irritation of the right. Immediate enucleation was insisted upon.

At operation the edema of the lids was so marked that the lid speculum was introduced with difficulty. The conjunctiva, Tenon's capsule and the underlying muscles were all adherent, and the muscles were isolated with difficulty. Recovery was uneventful, the symptoms of the right eye subsiding almost immediately.

Sectioning the eye revealed a practically complete *bony cup* from the ora serrata to the optic disc which, microscopically, showed true ossification. There were marked degenerative changes in the vitreous. The foreign body consisted of a thin irregular piece of copper 3 mm. square.

The case brings up several points of interest: First, the necessity of careful exclusion of a foreign body in all ocular injuries; second, the tolerance of the different structures of the eye to foreign bodies; third, the diversity of tolerance of the globe toward various substances, especially copper; fourth, the prognosis in retained intraocular foreign bodies.

In our case, apparently no attempt was made to ascertain the presence or absence of an intraocular foreign body at the time of injury. Jackson[2] places particular emphasis on the necessity of determining this point. A case presented by H. Barkan[3] was that of a

machinist who, two years previously, had an apparently superficial injury to the eye, yet when seen by Barkan, there was a definite siderosis and the X-ray examination demonstrated an intraocular foreign body. The literature presents many similar cases. In all eye injuries in which there is even the remotest possibility of an intraocular foreign body, an X-ray examination is imperative.

The tolerance of the different structures of the eye to foreign bodies varies greatly, the anterior chamber at times being very resistant. Meller[4] reports a sliver of iron in the anterior chamber of twenty-six years' duration without reaction.

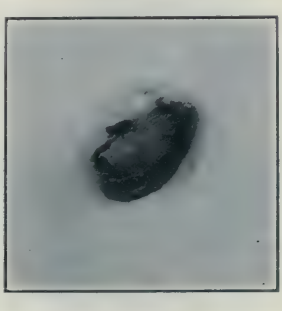

Fig. 1.—X-ray photograph of half of globe showing ossification and foreign body.

Foreign bodies of the iris usually set up a marked inflammation. The prognosis, as a rule, is good because of the ease of removal; in the difficult cases an iridectomy usually suffices. Bruner's[5] case retained a piece of steel in the iris for ten years before an inflammatory process necessitated its removal by iridectomy. Duane[6] reported a similar case, while that of Reitsch[7] tolerated a sliver of iron in the anterior chamber and iris for twenty-seven years and then, because of an iridocyclitis, required surgical intervention. The case report of Ollendorff[8] tells of an iron splinter that was quiescent in an iris for thirty years, and that of Birnbacher[9] twenty-five years, while the longest period of tolerance to a foreign body, to our knowledge, is that of a fragment of stone remaining in the iris for fifty-four years, as reported by Dickey.[10]

The lens is among the most resistant structures of the eye to the presence of foreign bodies. Würdemann,[11] in his book, states that a foreign body in the lens is less likely to produce injurious symptoms or sympathetic inflammation than in other parts. Knapp,[12] in one of his cases, however, had a panophthalmitis following the removal of a lenticular foreign body within a few hours after injury. Lewis' case[13] retained a splinter of iron in the lens without symptoms for six years, while Doyne's[14] case was quiescent for thirty years, and that of Nottage[15] thirty-two years. Doyle[16] reports a case of thirty-five years' standing, and in Blaxland's[17] case a lenticular foreign body was tolerated for forty years. In Sattler's[18] experience, all particles of iron in the lens produced a cataract. This statement is also upheld by Elschnig[19] who advises lance incision and extraction in these cases.

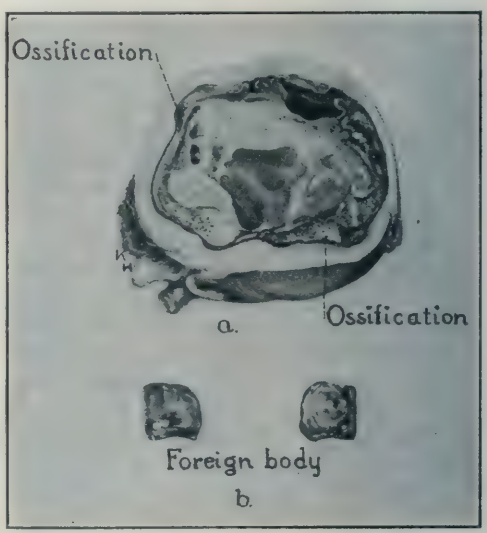

Fig. 2.—(A) Section of globe showing degree of ossification. (B) Foreign body.

Of foreign bodies in the vitreous, Fuchs[20] states that these usually excite violent inflammation from which the eye is destroyed. In exceptional cases a foreign body is tolerated so that it may be seen for years. Würdemann[11] comments that in the posterior segment they usually destroy sight, cause

atrophy of the globe and may result in sympathetic ophthalmia. The literature records the varying intervals of toleration in different cases. That of Reese[21] required attention after five years, while in Meissner's[22] there was a spontaneous expulsion after six years. Schonberg's[23] case remained

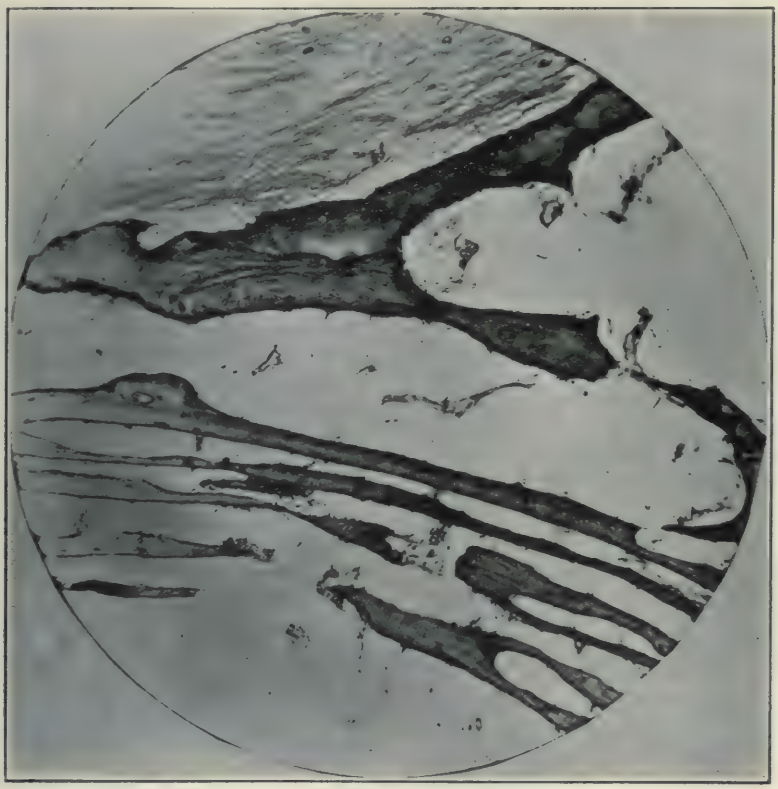

Fig. 3.—Microphotograph thru sclera and bone formation.

quiescent for twelve years, Fugita's[24] fourteen, while Dickey's[25] required interference after seventeen years. Roll[26] reports a case of eighteen years' duration, Banister[27] one of seventeen years' and Jackson[2] one of twenty-one years' which required no attention and had useful vision. Buckley's[28] case tolerated a foreign body in the posterior segment for twenty-nine years before enucleation became necessary. Our case, after a period of forty-six years, required surgical interference

The tolerance of the ocular structures to the various types of foreign bodies varies markedly, as is shown clearly by Leber[29] in his classical work. The details are too well known to necessitate repetition, but a few facts bear emphasis. He found that copper is among the most irritating of foreign bodies and that its action is a chemical one due to oxidation. Lead is the least dangerous of the metals. Boehm[30] concludes that fragments of lead behave more favorably toward the tissues than other metals. The prognosis is good even as concerns sympathetic ophthalmia. Wirtz[31] also substantiates this and adds that copper is among the most dangerous. Rollet and Aurand,[32] in their experiments, found that aluminum caused no reaction. Löwenstein,[33] in an interesting report, advises conservative treatment of fragments of stone as they are well borne. During the late war, Hertel[34] reported 242 cases of intraocular foreign bodies, giving the reason for the failure of the magnet in many cases as being due to

the alloys which were employed. These alloys, in addition, hastened siderosis. In a number of cases where it was impossible to remove all the foreign bodies, the eyes tolerated them surprisingly well. With copper fifty percent of the eyes were lost.

Leber[29] says of copper: "In as far as we know at present, metallic copper is the commonest chemical substance which produces suppuration in the eye; the retention of a fragment of which occurs not infrequently, especially from the explosion of percussion caps." Van Lint[35] concludes that bits of copper are, of all foreign bodies, most dangerous to the globe. Their destructive action is much more rapid and far reaching than iron, Lehmann[35] formulates his conclusions regarding slivers of copper in the vitreous as follows: Copper in the vitreous chamber is a serious danger for vision; immediate extraction to preserve the vision is indicated in every case, even if there be great difficulties. It is interesting to note that here the commonest causes of intraocular copper as described by Hirschberg[37] in 1895 still applies. His classification is: First, discharge of poorly constructed guns for children; second, biting of or accidental explosion of percussion caps; third, in industrial workers. He also comments that intraocular copper is a constant menace to an eye.

An explanation as to the formation of bone with foreign bodies is given by E. Treacher Collins,[38] who states that in one of his cases the probable cause of this condition is that the trauma and the entrance of the foreign body had caused a partial rupture of the choroid and bone developed in the plastic exudate thrown out.

According to Fuchs,[39] if there is a foreign body in the eye which cannot be removed at once, the eye is almost always lost. Also, in stating the prognosis the danger which threatens the other eye because of sympathetic inflammation must not be forgotten. After an unsuccessful attempt to remove a foreign body, that eye must be considered a constant source of danger to its fellow. This applies particularly when the foreign body is located in the posterior chamber, and especially if it is copper. If the patient's intellect is such that the risk can be understood and an oculist is accessible, such an eye, if quiescent, can be left in situ. If this is not the case, enucleation should be resorted to, particularly if the vision has been injured.

In conclusion, there are several points which bear emphasis.

1. An eye injury which has even the remotest possibility of an intraocular foreign body demands an X-ray examination.

2. The tolerance of the various structures of the eye to foreign bodies varies greatly. In one case a bit of stone was tolerated in the iris for fifty-four years, and in our case a piece of copper in the posterior chamber for forty-six years, while the removal of a piece of steel from a lens a few hours after injury, in another case produced a panophthalmitis.

3. The reaction of the eye to various foreign substances differs vastly, lead, aluminum and stone causing the least reaction, while copper ranks among those causing the most marked.

4. The prognosis of a retained foreign body should always be guarded and, in the case of copper, the eye should be enucleated unless the patient can be kept under proper supervision.

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TECHNIC OF OBSERVATION WITH THE GULLSTRAND SLIT LAMP

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To make microscopy of the living eye with the slit lamp a practical clinical method, requires thoro familiarity with the manner of doing it. This paper furnishes a guide to the practice necessary to master it.

The use of intense focal illumination in conjunction with observation of the living human eye under binocular magnification, as a method of refinement in diagnosis has made such advancement within the last few years, that a short outline of the technic of its application may be of aid to the many new workers in this interesting field of ophthalmologic research.

The fear that this method, owing to its supposed complexity, would of necessity have to confine itself to clinical application, and not be available to routine office practice, has been proven unfounded. To prove this it may be stated that a patient can be seated, the apparatus adjusted, the cornea, iris, lens, and anterior vitreous of both eyes carefully examined, within a period of six minutes. This, however, does not allow for a stoppage in contemplation of the many astounding and amazing new findings observable, even in normal eyes.

Of first importance is the seating of the patient in a comfortable position with his chin placed in a chin rest and forehead firmly fixed against the pad. This is self evidently as essential as is the fixed clamping of a slide on the table of a microscope. For all ordinary purposes it is only necessary for the patient to be asked to fix his gaze onto the observer's forehead as it appears above the microscope. The illumination is from the temporal side, while observation, except for certain special purposes, is in the direction of the antero-posterior axis of the eye. The

angle between illumination and the direction of observation should be chosen quite acute, for the purpose of deep penetration beyond the pupil.

For all practical purposes a magnification of about 25 times, such as may be obtained by the combination of objective A2 with ocular 2, is used most commonly. The bundle of light is then directed onto the iris, and the microscope adjusted laterally and in height to correspond with the eye to be observed, in the manner of directing a gun. The coarse adjustment is then used to bring the tip of the objective to about 1 1/2 inches from the cornea,

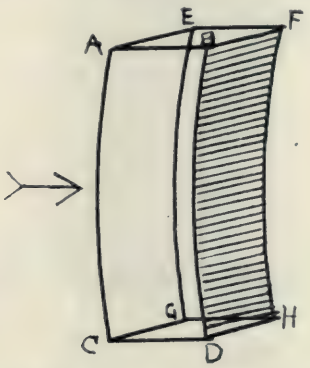

Fig. 1.—Optical section of the cornea, illuminated by the slit lamp. (See page 539.)

for the above named degree of magnification.

For examining the patient's right eye the micrometer screw for the fine adjustment of the microscope is directed by the observer's right hand, while his left controls the focus of the illumination, and its lateral displacements, by means of the thumb screw under the ophthalmoscopy lens at the end of the arm of the slit lamp. (This description refers to the combination of instruments as were illustrated, in an article by the same author, in the AMERICAN JOURNAL OF OPHTHALMOLOGY, of March 1921.)

In examining the left eye the hands are reversed, the left hand being in control of the microscope.

We are now ready to bring the relief of the iris into exact focus by means of the fine adjustment as controlled by the right hand, thus for the first time looking thru the eyepieces. We then intensify the illumination by changes brought about with the left hand, shifting laterally if necessary, and by screwing the same handle bring the bundle of light to an exact focus. At this stage it is necessary to adjust the interpupillary distance for correct binocular vision to suit the individual observer. This is easy of accomplishment, just as is the same process when using a prism binocular. We are now ready to make observation. It is not only necessary to have the object under observation in exact focus, but the light must also be exactly focused to illuminate this area to its maximum.

In order to simplify matters the two most important methods of observation, that by direct focal light, which is quite simple, and the method of transillumination will be described. In the latter method the maximum of light is reflected from a surface behind the area under observation, the latter being held in exact focus. A slight lateral displacement of the illumination is all that is often necessary to change from focal to inspection by transillumination of an area in focus. We may transilluminate the iris by light reflected from clear or opaque lens surfaces, and the cornea from the same or from light reflected by the iris. In this we may study the circulation at the limbus, or in vascularized cornea, steaming of the cornea, and depigmentation of the iris, as well as vacuole and fluid fissure formation within the lens substance.

One should study, first macroscopically, then microscopically the quadrilateral sharply circumscribed beam of light as it successively passes thru the cornea, rendered opaque by the intensity of illumination, the usually optically empty aqueous, thru the various layers of the lens substance and into the vitreous. Various depths may thus accurately be brought into view by simultaneous focusing of the microscope and the bundle of light onto the plane of observation.

The light as it passes thru the cornea more or less diagonally because of the angle of illumination, if in exact focus

at this point, sharply demarcates this zone as if it were an optical cut section. In the illustration, A B C D represent the anterior surface of the cornea illuminated from the left, E F G H the endothelial surface, and the plane B D F H is the diagonal cross section thru the corneal substance. Line B D when in good focus is plainly visible and divides the anterior surface (to the left) from the plane of the diagonal cross section thru the corneal stroma (to its right). As the light is moved slightly from side to side, the appearance and disappearance of objects will at this time show their depth within the corneal stroma, by their position within this plane (B D F H, the diagonal optical cross section). Thus for instance, it is found that the nerve fibers are only within the anterior half of the cornea, while certain newly formed blood vessels, such as are found after parenchymatous keratitis, are situated directly anterior to Descemet's membrane.

When a certain plane is in focus and the angle of incidence is the direction of illumination and the angle of reflection is the direction of observation, a reflected image of this plane is seen. Thus we may easily study the anterior corneal surface, if irregular, and the graining (shagreen) of the anterior and posterior lens, and the configuration and markings of the numerous intermediate nuclear lens surfaces, by viewing their reflected images.

Most astounding is the visibility of the layer of endothelium in the thus reflected image of the posterior corneal layer. Under a magnification of 65 times, each individual hexagonal cell may be seen easily. For this purpose a very wide angle between observation and illumination must be chosen. The object of this is to displace laterally the images of the two corneal surfaces, within the beam of light as it passes thru the cornea. In first examining for this, the individual chosen must be youthful, so as to present a comparatively clear cornea. He must be directed to look nasalward, so that a peripheral (temporal) corneal area is used. This is for the purpose of taking advantage of the gradual thickening of the cornea in this peripheral zone, which is of further aid in the lateral displacement of the two corneal surfaces from one another. Observation by the microscope is then directed temporalward instead of antero-posteriorly. This widens the angle between observation and illumination.

When the angle of incidence (illumination) and that of reflection (observation) to the plane in focus (endothelial surface) are equal, the surface markings of the latter are beautifully seen. Its carpet of hexagonal individual endothelial cells, as well as the well known Hassal-Henle "warts," the latter in persons of middle life and older, may be directly observed.

With the aid of the slit lamp one may by observation, so to say, flit from flower to flower, and much more quickly than the butterfly, in fact almost instantaneously. In a period of time hardly longer than the time necessary for the reading of these lines, one may successively have in focus, the corneal surface, nerve fibers as they are within the local area, the intricate structure of the iris and its pigmentation, observe the pupillary action, pupillary membrane remnants, the capsule, lens surface, nuclear surfaces as identified by their configuration, the posterior capsule graining, the multiform embryonic vessel remnants thereon, and lastly the beautiful delicate swaying supporting structure of the vitreous. And this makes no mention of the many, many new and interesting pathologic findings already so abundantly described by great numbers of observers in recent literature, and in the newly published works of Leonhard Koeppe and Alfred Vogt.

HOMATROPIN CYCLOPLEGIA. ITS EFFICIENCY AND DANGERS.

Wm. W. Lewis, M.D., F.A.C.S.

ST. PAUL, MINN.

The practice of instilling one drop of homatropin solution in the eye the night before it is to be used to produce cyclopegia is believed to add to its efficiency. In a case reported it seemed to furnish a danger signal that was acted on and resulted in cutting short an acute attack of glaucoma.

Most of us, after years of daily use of homatropin, entirely forget the possibilities of trouble from its use, and I am sure that by way of custom and habit this remarkably efficient drug is, by the majority of oculists, being used in a manner that predisposes to the little danger that does exist, and also in a way that gets the least efficient and least satisfactory action from its use.

I believe that, fortunately, my habit of giving a single instillation of homatropin the evening previous, for refraction in the morning, saved the patient serious injury in the case I shall report, for had she received the usual six instillations five minutes apart at one session, I question whether we would have been successful in combating the attack of tension.

CASE.

Miss C. B. T., twenty-two years old, a resident of the West, here on a visit, was brought to the office by a relative for glasses. She was unmarried; had been at home since completing college. Heredity negative. Previous ailments: "Some inflammatory trouble in eyes during childhood." Present complaint: Frontal headache, especially left, coming on in the afternoon. General health and appearance good.

Examination: External findings: Face symmetric; globes rather prominent. Lids, lacrimal apparatus, conjunctivae of lids and bulb negative. Corneae and sclerae normal in appearance by day light. Anterior chambers shallow; irides negative; pupils large, equal, round and react moderately well in contraction as to degree and promptness. Tension by fingers full and firm, but no indication of pathologic degree. Binocular fixation good; movements unrestricted. She was wearing. R—0.50⌒—0.62 ax 90°. L.—0.50 ⌒—0.50 ax 165°, which were prescribed by an oculist under cycloplegic.

Vision, without correction: R. 5/10. L. 5/10. Manifestly, accepts small amount of plus glass; near point R. 10 C. M., L. 15 C. M. Muscle balance and muscle strength within usual limits.

Intrabulbar finding: By oblique illumination and loupe, light gray streaks of old obliterated vessels in corneae indicating former parenchymatous keratitis, ("some inflammatory trouble in eyes during childhood," brought out in history above), and accounting for lowered acuity of vision, (noted above); anterior chambers, irides, pupils and surface of lenses negative by oblique illumination.

By ophthalmoscope: Lenses, vitreous, nerve heads and fundi, negative, except vessels seemed a little undersized; ophthalmometer shows small amount of astigmatism with rule and no irregular corneal surfaces; fields not taken before attack, and she left for home before I had an opportunity to take fields after her experience.

Patient was given 3% homatropin to drop in eyes at bed time and again at breakast time the next morning, and told to report for (retinoscopy) refraction at 10:00 a. m.

About daylight the following morning, I was informed that she had had a bad night, beginning with slight pain in the eyes about midnight, and of increasing severity until the pain and headache were unbearable, and that she could not see more than shadows and forms. My first thought upon hearing from her was that of exaggeration; but upon seeing her early, before breakfast, I found to my consternation very hard eyes, decidedly steamy corneas, and vision reduced to light, shadows and forms, suffering great pain in eyes and head. I took her in my car immediately, got a special nurse and with instillation of eserin each hour and with hot ap-

plications and codeia and aspirin for pain, succeeded in about twelve hours in combating the tension, and her vision cleared before the next day. My subsequent observation was of very short duration after the attack, as she left for home shortly and I have not heard definitely of any trouble since. I impressed upon her the inadvisability of permitting dilating drops to again be put in her eyes, and wrote her oculist in her home town of my experience.

To my knowledge and in my experience and reading, I am sure that such an effect from cycloplegic, especially homatropin, in one so young is a very rare occurrence.

Some of the London men at Moorfields impressed upon us as students the decided advantage of taking time and waiting for the best action of homatropin, and some of the Canadians of my acquaintance use it this way. The argument is that the precipitate and hurried use of homatropin, the so-called "railroad" method of repeated instillations (five or six), five minutes apart, with an interval of half an hour before retinoscopy and try out does not give nearly the degree of complete cycloplegia that the slower method, over night, gives; that the iris and the ciliary body in rapid dilatation are incapable of the comparative depletion of blood in their vessels, and that muscular tone of the ciliary body and iris is not lost in this short time, hence accommodation to a degree persists. I believe that this is entirely true and such has been many times proven to my entire satisfaction. Nearly always, with me, the cylinder shown in retinoscopy with this hurried method is decidedly pulled down in amount at the try out test by young adults, whereas in the overnight method the cylinder shown in my retinoscopy is fully accepted by the patient at the try out. As a result the necessity of using atropin in these young people, students and the like, is much less frequent, and with the accompanying less inconvenience of the prolonged cycloplegia of atropin. Then further, as indicating the increased effect of homatropin by the overnight method, the degree of increased cycloplegia is shown by the longer time necessary for accommodation recovery. Three days seems to be the minimum time in which the patient regains his near point, whereas two days seems ample time for him to do so after the hurried method.

While the rare occurrence of tension would seem to be of little consideration in favor of the overnight method, yet it cannot be denied that the routine single instillation the evening previous would prove to be a safeguard and a "feeler," so far as this unpleasant accident of tension is to be considered, and a precaution against the more serious state of affairs that would be present after many and repeated instillations at one sitting. My office attendant is instructed to be alert in her observation and hearing from patients upon their arrival in the morning of any discomfort experienced, the usual routine of the busy office, wherein the office attendant begins the drops before the oculist arrives, is thus safeguarded.

One drop of three percent solution of homatropin at bed time and one at breakfast time proves, very often, in the case of patients thirty-five to forty-five or fifty years of age, sufficient to retinoscope and refract accurately, with all the advantages of satisfaction, speed and accuracy as against the unsatisfactory manifest fitting. In the case of younger patients, of course some added drops have to be given upon their arrival at the office, the number being necessarily increased the younger and more robust they are. In the case of strong young people, eighteen to twenty-five years of age, I instruct them to have a drop put in each eye at supper time, at bed time and at breakfast time; and upon arrival at the office in the morning they get as much as four to six drops five minutes apart, followed by a wait of thirty minutes before retinoscopy and try out. In this way I am very seldom obliged to use atropin, even in these young students, whom we all know are the hardest to

handle with anything short of two to three days use of atropin.

It occurs to me likely that much of the stable, satisfactory cycloplegia of atropin is due to the plenty of time we give it to act (two to three days). Homatropin, too, is in a like manner much more efficient when used overnight, in advance. To expect more than a mild degree of cycloplegia from the use of a single disc of homatropin placed in the conjunctiva, in my opinion and experience is not justified. Men who do not place great reliance upon retinoscopy can be satisfied with dilatation of the pupil merely, without real cycloplegia, but those who strive for, and are not satisfied with anything less than a constant accord between their retinoscopic and try out figures are dissatisfied and upset with any less than full cycloplegia. The real hard cases that have gone the rounds are not satisfactorily handled without it. I can see no advantage in the use of cocain, combined with homatropin, especially in the slow method; but considerable disadvantage thru clouding of the cornea unless the patients are closely watched and made to keep their eyes closed; then, too, the congestion and reaction in the eye seem to be more after the ischemic effect of the cocain wears off.

In children and in juveniles up to seventeen or eighteen years of age, I use atropin and, of course, in case of spasm and cramp of accommodation I adhere to the prolonged use of weak solution of atropin.

ENTROPION FOLLOWING INFLUENZA, WITH NEW SURGICAL PROCEDURE.

C. A. Clapp, M.D., F.A.C.S.

BALTIMORE, MD.

In the case here reported the entropion seemed to be due to disappearance of orbital fat. Fat transplantation was practiced to make up for the deficiency.

The patient, a white female twenty-seven months of age, was brought to my office on November 18th, 1920, with history, that until four months of age she had been healthy with no trouble with her eyes. She developed a very severe case of influenza during the last week in December, 1918, after which there was a gradual turning in of the eye lashes, especially of the lower lids.

At examination, each lower lid was found to be turned in resembling a spastic entropion. The cilia themselves were not misplaced or diseased in any way. The outer fourth of the right upper and outer third of left upper lid were also turned in, with the cilia brushing conjunctiva and cornea, thereby producing a keratitis which caused the child to be fretful and irritable, due to constant pain of the eyes.

Altho the history indicated no trouble until after influenza, I was of the opinion that the case was one of congenital entropion, which was made worse by the illness, but Fig. 1, which shows the child at three months of age precludes any such supposition; as one can easily see the lids in their proper position, altho the eyeballs are somewhat prominent.

The patient was anesthetized with ether on November 19, 1920, with the intention of removing an elliptical piece of skin and the orbicularis fibers, but after making an incision two mm. from the external lid margin, and removing the orbicularis fibers with strip of skin and subcutaneous tissue eight mm. wide, it was found, after bringing the margins of the wound together, there was still the same tendency to entropion, due to absence of the orbital fat. It was then decided to try to get the desired support by inserting a fat transplant, so a piece of such tissue being removed from the abdominal wall, a dissection was made downward into the orbit just beneath the con-

junctiva, where it was very apparent that there was a marked deficiency of adipose tissue. The fat transplant was placed in this pocket, and several sutures of catgut inserted between the edges of the incision on the plane of the deep subcutaneous tissue; the skin incision was brought together accurately by interrupted silk sutures. A collodion dressing was. applied, then a Murdock cataract shield, and the eye left open.

There was very little reaction following the operation, the eye was cleansed at frequent intervals, and the sutures removed at the end of ten days. A slight stitch abscess occurred, which healed after a few days, and the patient left the hospital with the lower lid in normal position.

As far as we were able to discover this was an entirely new procedure, so the right eye was not operated upon until we had seen the results of the first operation. Patient reported again on December 15, 1920, at which time there had been no change in the condition; and the same operation was performed upon the right eye, with the difference of extending the incision around the external canthus so as to correct the inversion of the upper lid.

As a result of technic, and the fact that we were more familiar with the operation, this wound healed by primary union. We varied the dressing, by changing to a sterile pad and bandage. Convalescence was uncomplicated and the patient returned home with right lids in normal position, but left upper lid still faulty, as no serious attempt had been made to correct it.

Fig. 1.—Entropion following influenza, child three months old.

Fig. 2.—Appearance after absorption of fat, from right orbit.

In March, 1921, patient was again seriously ill for many days; after this illness, the mother noticed some alteration in the lids. Upon examination on June 1, 1921, the right lower lid was found with lashes turning directly up, but not touching the cornea or conjunctiva, the fat insert having undergone considerable absorption. The upper lid was in normal position. The left lower lid was normal with the outer third of upper still showing en-

tropin but further operation was deferred until fall on account of the rather delicate condition of the patient.

Fig. 3.—Remaining recession of lids, no entropion.

The same condition existed on October 27, 1921, when patient was again placed under ether, and an elliptical piece of skin and subcutaneous tissue was removed from outer third of left upper lid, and a small piece from lower lid, a similar piece being removed from right lower lid, the wound being closed with interrupted silk sutures. Healing by primary union and patient was allowed to return to her home in the country. A final examination on December 19, 1921, shows correct position of all lashes, but still some recession of lids due to absence of orbital fat.

Comment: This condition must be one of extreme rarity, as a rather careful research of the literature fails to reveal reports of cases of entropion due to absorption or lack of orbital fat. Why in this case there should have been a predilection for this tissue is inexplicable, as all are so well aware that even in cases of extreme inanition the orbital fat is one of the last tissues to be sacrificed to the general economy, and yet a study of Fig. 1 shows plenty of such tissue, while Fig. 2 shows very great lack of same, with entropion.

Fig. 3 still shows recession of lids, altho there is no entropion; the keratitis has undergone resolution and the results are gratifying.

While the use of this method of correcting entropion will be applicable only in a limited number of cases, we believe its utility was demonstrated in this case, and it is quite possible that the same principle could be utilized in cases of loss of tissue other than those showing absorption of fat.

NOTES, CASES AND INSTRUMENTS

WRESTLERS' TRACHOMA

JAS. M. PATTON, M.D., F.A.C.S.

OMAHA, NEB.

Although it is pretty generally admitted that trachoma is decidedly contagious, occasionally some one raises a voice to the contrary, (H. B. Young, Trans. A. Academy of Ophthal. 1920, p. 196), and it is not often that we can trace the exact sequence of infection, incubation and the onset of active symptoms. The history given by the patient is usually indefinite, and about the best we can hope for is the admission that possibly someone else in the family has, or has had sore eyes, or he has been working in close relation with large groups of individuals such as found in labor camps, institutions, etc.

Within the last few months, my colleague, Dr. H. Gifford, and I have had a number of cases which supplied us with the exact sequence above mentioned, all of them in professional wrestlers, and in several cases, they were able to give the exact time of infection, and the incubation period, and presented themselves to us with well marked clinical evidences of active trachoma. We have seen eight cases in all, but they told us of many more of the members of this profession who were afflicted with the same trouble. I wrote to a dozen or more of these men, but failed to get replies. Evidently they had no relish for publicity along medical lines. Of the eight we treated, four of them were either champions, exchampions or wouldbe champions. The other four were all of sufficient national reputation to have had bouts with the big fellows, and their names are well known to the followers of the wrestling game.

The first to consult us was J. L., who stopped off on his way from the western coast, with a very profuse granular conjunctivitis, which he said had come on subsequent to a match ten days before, with, if I remember rightly, W. Z. We made a diagnosis of probable trachoma but as we did not know at the time that W. Z. had trachoma, we simply advised him to consult an oculist when he got back to his headquarters. A later report confirmed our diagnosis of clinical trachoma.

In the meantime, we had been treating two local wrestlers, G. K. and C. W. H. G. K. was not sure as to the origin of his trouble, but it came on following a finger injury to the eye while wrestling with C. J. C. W. H. stated that his trouble developed after a bout with his wrestling partner, G. K., the trachoma in both cases running a typical course.

March 11th, E. C. presented himself with an acute inflammatory conjunctivitis, which came on eight days after his match with the above mentioned J. L. The clinical condition was characteristic in every respect. He has reported from time to time and has improved, but is not entirely over the trouble.

Six days later, C. P., another of the big time men, brought his trachoma to us with the same history. He had had a finish bout with S. Z. and about six days later his left eye became inflamed, followed the day after by the right. He had profuse trachoma which has been very resistent to treatment.

J. S. came in April 5th and told us that eight days after wrestling with S. Z. his right eye became sore. We saw him six days after the onset of the trouble with a thoroly characteristic trachoma. Twenty-four hours before consulting us, he noticed a severe inflammation of his left eye and examination showed profuse trachoma on both sides of exactly the same type as observed in the other wrestlers. Apparently the second eye was infected from the first about six days after he noticed the symptoms in the left. We were able to see him only two or three times, but he promised to carry on the treatment vigorously.

J. P. did not show up until April 27th, ten days after wrestling with C. P., mentioned above, and while C. P. was in the most active stage of the

trouble. J. P.'s trachoma developed about ten days after inoculation, and when he consulted us, he had profuse trachoma of the characteristic type, the right eye the worse. He was given treatment and told to return, but several attempts to get in touch with him have been fruitless so we cannot say how he got along.

The next of our athletes to appear was G. T., who came in September 15th with subacute trachoma contracted after wrestling with W. D., to be mentioned later. He was sure the infection appeared four or five days following the match, which had occurred some two or three months previous to his consulting us. As his home was in a neighboring city, we referred him to his local oculist and have not heard as to how he got along under treatment.

The genealogy of this particular type of trachoma reminds one of the small boy who passed the measles around to his school mates that they might all get a vacation. According to E. C., it originated with W. D., who passed it to E. L., who gave it to J. F., who then passed it to S. Z., who gave it to W. Z., who passed it on to J. L., from whom E. C. contracted it. C. W. H. thinks it started with C. J., who gave it to J. F. above mentioned, from whom the other heavyweights contracted it in the order above mentioned. Of course, this is more or less speculative and of no clinical significance, and it is quite possible that there were several sources from which the trouble started. In questioning the men who came under our notice, they explained that in the course of wrestling matches, they perspired very freely, and when the referee was not looking too closely, often massaged each others' eyes very vigorously, unconsciously, no doubt, attempting to elicit the well-known oculo-cardiac reflex. Whether they were successful or not in this it will not be known, but it is very evident that they succeeded in thoroly inoculating their opponents with the active principle of trachoma, whatever it is, and established beyond the possibility of a doubt, if such were necessary, the contagiousness of this disease.

It has been our custom in these cases to warn the men infected concerning the contagiousness of the trouble and the serious results which follow if not properly treated; and we have urged them to warn their opponents as to the possibility of infection and advise them to take active prophylactic measures immediately after each match to avoid if possible the trachoma. The men were apparently very willing to cooperate in this way, and without exception were a splendid bunch of fellows.

As to the treatment, where we have been able to keep them under observation, we have followed the usual line of procedure with copper sulphat and expression with forceps. In the cases where they were unable to return, we either taught them to use the copper themselves or supplied them with a solution of copper and advised them to consult a reliable oculist whenever they had an opportunity. Evidently the campaign has not been without effect as we have not seen any new cases of this trouble since September 15th of last year.

SUPERFICIAL PUNCTATE KERATITIS.

EDWIN D. WATKINS, B.S., M.D.

MEMPHIS, TENN.

M. S., age ten years, a school girl was sent to me Feb. 23, 1922, by Dr. N. W. Sherman.

History obtained from the mother was, that for the three days past she had had extreme photophobia, lacrimation and pain in right eye. The right lids had been stuck together in the morning. She had had weak eyes since she started to school three years ago, manifested by occasional lacrimation and some asthenopia. Occasionally there had been pus in the inner corner of either eye thruout the past three years. For two weeks she had had a severe coryza and sore throat. Since infancy she had been subject to repeated attacks of croup.

The patient was a well nourished girl. She was in evident great distress, holding a handkerchief before the right eye. The examination was made with much difficulty as the light caused intense pain. The conjunctiva was injected and some mucopus was present. Smear taken of the conjunctival secretion, which showed only a staphylococcus. Just internal to the center of the right cornea, and superficial, there was a small gray spot over which the cornea was lustreless. This spot did not stain with fluorescein. The pupil reaction and iris were normal. The anterior chamber was normal. The lacrimal sacs showed nothing on pressure. The tension was normal to palpation. The left eye was normal.

Examination of the nose was negative. The oropharynx was somewhat redder than normal. The tonsils were enlarged and pus was squeezed out of some of the crypts. The teeth were in excellent condition.

A 1/5% zinc salicylat solution, in camphor water, was prescribed and dark glasses advised. The patient was told to return the next day.

March 1. The photophobia was worse. The left conjunctiva was red and there was some mucopurulent secretion therein. The left eye was sensitive to light. There were three new spots about the original one in the right cornea, none of which stained with fluorescein. They were superficial. No spots in left cornea. Specimen of urine brought was free from albumin, glucose and indican. 1% atropin sulphat was prescribed and the zinc continued. Tonsils looked the same as at the time of first visit.

March 8. No change in right eye. Left photophobia as bad as right. No spots in left cornea. The patient was about as miserable as could be. The pain in each eye was severe, and ordinary daylight of the office was unbearable. Treatment continued with addition of 1% yellow oxid of mercury ointment to be used three times a day.

March 16. Conjunctivitis each eye well. Photophobia as bad and distressing as could be. I never saw a more miserable patient. Two more spots had appeared in the right cornea close to the original one, and some fine lines of infiltration had made appearance between some of the spots. There was one spot in the left cornea symmetric with and exactly like the first to appear in the right eye. None of the spots stained with fluorescein.

I explained to the mother that cases of this kind often ran a long and tedious course and that the case probably was one of toxic action from some focus of infection and went on to say that it was my judgment to have the tonsils removed as they were diseased. I made no promise of prompt recovery after tonsillectomy. The operation was agreed to.

March 17. At St. Joseph's Hospital, under ether anesthesia, the tonsils and adenoid were removed. As the snare tightened on the tonsils much pus was squeezed out, more out of the right. There was a large adenoid. Recovery from the anesthetic was prompt. All treatment was stopped. The patient left the hospital the afternoon of the same day.

March 18. Patient's mother called me on the telephone and told me that the photophobia was much less; and that the patient slept soundly for the first time since three days before I first saw her.

March 19. Called to see patient at her home. She was playing with other children in the living room. She did not wear the bandage and said that the light did not cause sensation. This was at 3 P. M. on a cloudy day. The patient went on the porch and altho the pupils were at maximum dilatation due to the atropin, there was little sensation due to the light. No examination of the cornea was made at this time.

March 22. Examination at the office showed the left eye entirely clear. No remains of the spot were seen. The right cornea had cleared except for the original spot. There were no symptoms.

April 6. The eyes were perfectly normal. No opacities.

The diagnosis of keratitis superficialis punctata was made because of the

age of the patient, the fact that she was a subject of repeated catarrhal attacks of the upper respiratory tract, the slight conjunctivitis and the character of the lesion of the cornea, being a superficial, small grayish infiltration that did not stain with fluorescein. The diagnosis seemed clinched with the appearance of the other lesions, especially with the participation of the other eye. The spots looked as if they should stain but did not. The sequence and diffusion of the lesions of the corneas argued a toxic condition arising from some source of focal infection. I can not but believe that either the tonsils or the adenoid furnished this focus.

TWO CASES OF EXOPHTHALMOS.

H. J. Heeb, M.D., and W. Van de Erve, M.D.

MILWAUKEE, WIS.

The first case was that of a girl 17 years of age, who first came under our observation on account of persistent headaches, extending over the past three years. Her family history was negative.

Personal History: Measles at four, Small-pox at thirteen, and influenza at fifteen years of age. Patient is robust and in apparent good health.

An examination of her face discloses an asymmetry, the left eye being about one half cm. lower than the right eye. There is also a marked proptosis of the left eye with a five degree exophoria. Patient had a chronic dacryocystitis of the left lacrimal sac. She gives a history of constant lacrimation since childhood. She had been told that the protrusion of the eye was worse the first three years of her life, after which there was a slight reduction in the proptosis, and then it remained stationary until one year ago, when the condition became aggravated.

The exophthalmos is worse when she stoops. There is no history of diplopia or of dizziness and there are no subjective noises in the head. There is a rhythmic pulsation in the left eye synchronous with the pulse. Patient first noticed the pulsation when she was six years old. Pulsations appear to be continuous.

There is no enlargement of the thyroid gland nor are there any symptoms referable to Graves' disease. Pressure over the common carotid, on the affected side, does not influence the pulsations.

The proptosis can be very readily reduced by pressure with the fingers but promptly returns.

The pulsation can best be elicited by looking at the patient's eye in profile, when the rhythmic pulsations are plainly visible. There is no bruit present. Media and fundi were found to be normal. The vision in the affected eye is only 15/200, which with correction could be brought up to 20/70, while in the normal eye vision is 20/30 and with correction 20/20. The loss of vision is no doubt due to amblyopia ex anospia and also the exophoria, as there is a much larger refractive error in the left eye than in the right.

On account of the ease of reduction of the proptosis, solid or semisolid tumors of the orbit were excluded, and on account of absence of bruit and the fact that the condition was not influenced by the pressure over the common carotid, on the affected side, aneurism and arteriovenous or arteriosinus communication were also excluded.

An X-ray of the patient's head showed a very interesting condition. The superior and temporal wall of the orbit were absent and the *orbital and cranial cavities were in direct communication.* Consequently the exophthalmos was due to pressure from the brain and the pulsations were due to the same source.

Case 2. A girl seven years of age first came under our observation one and one-half years ago with the following history:

At the age of two years and a half, during the momentary absence of her mother from the room, she suddenly developed a very marked proptosis of the left eye accompanied by a marked esotropia. There was no history of injury and health of patient was and remained good, nor were there any

inflammatory symptoms of the eye at the time. There had been no change observable in the degree of the exophthalmos since then, except a slight variation at irregular intervals, in that it appeared to be slightly more prominent some days than others. There was no pulsation and unlike case one, in which the proptosis was readily reducible, this one could not be reduced. When case first came under our observation, vision had been materially reduced but she could still count fingers. This was gradually lost until at the time of operation it was doubtful if she had light perception.

There were no subjective noises and there was no bruit.

Ophthalmoscopic examination showed slight haziness and marked pallor. Arteries were small as compared with veins. The X-ray findings were negative.

On account of the sudden onset, an arteriovenous communication or an aneurism were suspected, but the absence of a bruit and also the inability to reduce the proptosis negatived this diagnosis. Solid tumors or cysts were excluded by the history of the sudden onset of the condition. The final conclusion was that of angioma, as these growths may have a sudden onset and may become rather solid and they are not always accompanied by a bruit.

Operation: As the eye was so markedly proptosed that the posterior pole of the eye was almost palpable, we judged it unnecessary to perform a Kroenlein; but by making an incision along the border of the eyebrow, outward and downward, we expected to be able to retract the eye and soft tissues sufficiently to inspect the orbital contents and to remove the cause of the exophthalmos. Especially did we come to this conclusion as vision was practically nil and blindness as the result of injury by traction on optic nerve was not feared. Accordingly a curvilinear incision was made thru the eyebrow, beginning above the orbital notch, upward and downward to a point opposite the external canthus. The soft tissues were then severed by blunt dissection, the eye was retracted forward and downward, and the contents of orbit explored.

It was found that there was a cyst in the orbit intimately attached to the optic nerve, immediately posterior to the entrance of the optic nerve in the eyeball. It was found impossible to remove the cyst without the removal of the optic nerve. The optic nerve was accordingly severed; and the cyst, which extended back to the apex of the orbit, was enucleated after a ligature had been passed around its base and tied as far back as we were able to reach, and the cyst cut off close to the ligature.

The gross specimen was about two cm. in diameter and the part removed was approximately three cm. long. The contents of the cyst consisted of a thin serosanguinous fluid. The optic nerve merged with the walls of the sac and was indistinguishable from it. The specimen was sent to Dr. Hopkinson of Milwaukee, and a diagnosis was made of a *hemorrhage into the optic nerve sheath with subsequent cystic degeneration.*

The case unfortunately developed an infection which started in the interior of the eye and later extended into the orbit. We ascribed the infection partly to the trauma produced by the manipulation at the time of the operation, but mostly to the sudden loss of its major blood supply by the cutting and tying of the ophthalmic artery. We were, however, fortunate in being able to save the globe, altho there is considerable alteration in the appearance of the cornea and iris, but as vision had been lost in the eye this mattered only cosmetically. There is still ptosis of the upper lid, and an operation may be necessary subsequently to correct this condition.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Thursday, January 19, 1922.

Dr. G. Oram Ring, Chairman.

Pseudopterygium and Symblepharon Corrected by Teale's Operation.

Dr. Charles R. Heed exhibited a male patient, aged 34 years, electrician, referred to the Jefferson Hospital in the service of Dr. H. F. Hansell, August 1, 1921. Eighteen months previously, the left eye had been severely burned with acid. Patient had suffered constantly with diplopia and exposure keratitis as a result of the adhesions. Examinations revealed an extensive symblepharon. Two-thirds of the upper lid conjunctiva, from the inner angle outward, was adherent to the globe by dense cicatricial tissue, and the adjacent cornea was covered for one-third of its area by a dense, vascular pseudopterygium. Patient stated the adhesions had been severed twenty-one times without relief.

The following day under cocain anesthesia, the cicatricial tissue was incised at the limbus, dissected entirely free from the globe and allowed to retract. A flap of conjunctiva was dissected from the upper and outer portion of the globe, turned and sutured so as to cover the upper exposed half of the defect. A similar flap from the lower part of the ball was sutured to cover the remaining exposed area. The margins from which the flaps were taken were then brought together. After healing, the patient could readily close the lids, had no diplopia, and practically no irritation. The cosmetic effect is better than expected, due to the atrophy of the tissue forming the pseudopterygium.

Atrophy of Iris.

Dr. Frederick Krauss presented a girl, aged four years, in whom the iris pigment had been absorbed in the lower half, the lower pupillary edge of the iris being replaced by a broad crescent of white connective tissue adherent to the anterior capsule of the lens. A good reflex was obtained thru the pupil and the remaining iris stroma below. No view of the fundus could be had on account of apparent fine capsule haze. V=Light perception.

The child five weeks after birth had a fine general haze of the cornea of the right eye, from which there was perfect recovery. Fourteen months later, a large hemorrhagic exudate appeared in the anterior chamber of the left eye, associated with inflammatory symptoms. The cornea became hazy in two-thirds of its extent, but the mass gradually became absorbed, and the cornea cleared. Below the pupillary space some of the exudate organized into scar tissue, flat against the lens. The child has been unusually healthy. The family history is negative especially as to tuberculosis and syphilis. The laboratory tests are negative. The hemorrhage was apparently spontaneous.

Sclerosis of the Choroid.

Dr. Luther C. Peter exhibited W. M., aged 52 years, who had failing vision for about ten years in the left eye. When a child, he was struck in the right eye, the injury explaining the presence of a shrunken capsule, the remains of a traumatic cataract. The capsule is detached above, and falls back towards the vitreous body. The disc is small and atrophic, dirty yellow in color; arteries and veins are much contracted. The retinal pigment has undergone absorption, and is deposited in spider like areas thruout the fundus, for the most part distributed along the vessels. The choroidal circulation is plainly visible, and in the region of the disc consists mostly of white lines of varying thickness, which assume more nearly the appearance of the normal choroidal circulation toward the equator.

In the left eye, there is a central lenticular opacity and the same general fundus picture obtains as developed in the right eye, altho the sclerosing process is not so complete. Thru a red light filter (Wrattan filter), the choroidal circulation is particularly well defined.

The patient has a + 3. Wassermann. The fields are contracted in both eyes, and color fields are almost as large as form.

The condition is a sclerosing of the choroidal circulation, with atrophy of the retinal elements and of the optic nerve. The etiology is probably lues.

Leber's Disease in Four Generations.

Dr. Luther C. Peter presented three cases, typical examples of Leber's disease, in a brother, sister, and the son of the sister. Out of twenty-three descendants for four generations, fifteen have suffered from the disease. There has been more or less uniformity as to age, mode of onset, and subsequent history in each generation.

The onset was usually sudden, between the ages of fifteen and twenty years. In each of the cases presented, vision was so much disturbed that the patients were led around for several months. Then followed improvement, and return of peripheral, and partial return of macular vision, which, so far as can be determined, has remained in statu quo thruout life, or with very slight subsequent loss, with two possible exceptions, which will be noted. Macular vision remained permanently damaged, at least to some extent, in each case. In two cases vision subsequently diminished in acuity. It is alleged that one young man of twenty-two years lost his sight completely just before death, which was caused by pulmonary tuberculosis, while the other case is one of the third generation, whose vision rapidly grew worse after each alcoholic excess, and it is said that he now has little sight left.

The fundus appearance is similar in the three patients. The discs are grayish white, fairly well outlined, and the cribriform membrane is plainly visible. Arteries and veins are contracted, but not so small as observed in secondary, postchoroidal, or postretinal atrophy. The disc is not so clear as in primary atrophy. Beyond the disc, changes are not marked.

In the case of the sister and her son, careful studies have been made. Wassermann is negative, X-ray of the sella turcica shows no enlargement, and the sinuses are practically normal. The son is somewhat feeble minded, but apart from this condition, the neurologic report of Dr. Theodore Weisenburg is negative. The cases are interesting in a negative way. Form fields show little contraction. The blue and the red are contracted; green, is not recognized excepting in small areas close to the point of fixation. In each of the three cases, there is a central scotoma, varying from an indistinct to relative and absolute, and of varying size.

Dr. Peter referred to the points of greatest interest in Leber's disease as the etiology and the character of the atrophy, and mentioned the various theories advanced and said that, from the evidence thus far produced, however, altho perhaps vague and inconclusive, it is probable that the solution of the etiology of this singular disease will be found to be a manifestation of a hereditary type of disturbance of the internal secretions.

Sarcoma, Glaucoma and Complicated Cataract.

Dr. S. Lewis Ziegler presented a patient, aged 41 years, exhibiting so many unusual complications as to deserve the designation of a "pathologic mine.' These was a history of sarcoma of the forehead and supraorbital tissues, first excised by an osteopath in 1918, leaving exposed frontal sinuses which did not heal. The tumor rapidly recurred in a much enlarged and more malignant type. In 1919 Dr. W. L. Clark removed all traces of the growth by inserting a series of small radium needles, about one inch apart and allowing them to remain twelve hours. The seances were twice repeated. Since that time, now more than two years, no recurrence has been noted.

O. D., absolute glaucoma, with the possibility of sarcomatous metastasis, caused a decision in favor of enucleation. Section of globe shows glaucomatous cup and soft opaque lens but no tumor.

O. S., vision 20/40, J. 3. During January, 1921, her father's death caused grief and crying. On Feb. 2, 1921, stinging pain in O. S. followed by blurred vision, small hemorrhage in anterior chamber, and vision 20/70; T + 1; fields for form and color contracted; pupil not dilated. On Feb. 8, while examining the eye, a spurting hemorrhage from the iris was observed. On Feb. 10, a posterior sclerotomy was performed, as both trephining and iridectomy seemed inadvisable. Slight hemorrhages occurred, both in the anterior and vitreous chambers. The Parinaud incision was performed with broad Graefe knife, the blade being rotated at right angles and a V-shaped incision made. Altho the wound was carefully closed lacrimal infection occurred, the exudate visibly covering the ciliary body during the next thirty-six hours. An injection of mixed infection phylacogen was given, followed by seven others on alternate days. The infection subsided, leaving a slight haze of the posterior capsule, which developed into a soft cataract similar to the other eye. The glaucoma was kept under control by eserin and negative galvanism. The scleral incision bulged slightly and tension finally became normal, but the pupil was somewhat irregular.

As the light field was excellent, at the end of eight months, complete V-shaped discission of the lens, was done on Oct. 24, 1921, since which time the lens has been undergoing gradual shrinkage from above downward. There has been no rise of tension. Sph. + 10. D yields a vision of 5/200 by looking thru the clean area above. The previous plastic capsulitis has made convalescence slow.

Complications Associated with Todd Tucking Operation.

Dr. Harold G. Goldberg described several complications which he had met with in the performance of the "Todd Muscle Tucking Operation." His purpose in treating this subject was not so much because of the importance of the Todd operation, as that he attempted to prove that all operations upon the muscles of the eye which had for their object a shortening of the tendon, produced strangulation of the blood supply of the muscle, because of the manner in which the sutures were applied. This point was brought so forcibly to his attention in connection with the Todd operation, which in one case produced complete strangulation and sloughing, that he thought it was important to bring the matter to the attention of the Section for discussion.

Discussion. Dr. J. Milton Griscom said he had used the Todd tucking operation exclusively during the past two years, and found it more satisfactory than any other method. In the last fifteen consecutive cases ten were completely successful, three partially so, and two were failures. He had not seen any bad effect from strangulation of the muscle, as reported by Dr. Goldberg, but he considered it an important point against the operation, which may be responsible for failures which we attributed to other causes.

Dr. Wm. Campbell Posey said that he had never employed the tucking operation, on account of the possible strangulation of the muscle which it might entail. Lately he had made use of a twin single stitch operation, by means of which the muscle and superlying conjunctival and tendinous tissues were brought forward as close to the cornea as possible by two mattress sutures, symmetrically inserted thru the upper and lower halves of the muscle. His results were better by this procedure than any other he had previously employed. There was but little reaction, on account of the slight incarceration of the tissues by the sutures, and the removal of the stitches was extremely simple. Dr. Posey dwelt upon the desirability of approximating the flap containing the tissues to be advanced to the site of the sutures buried in the capsular tissue, by

forceps, before tying, to prevent the sutures cutting their way out thru the tissue from undue dragging.

Dr. Wm. Zentmayer said for several years he had practiced the O'Connor method of tendon shortening, but felt compelled to abandon it because of certain disturbing complications that frequently resulted. In the cases in which there were no complications, his results were better by this method of operating than by any that he had heretofore or since used. In one of the three cases operated upon by O'Connor himself at Wills Hospital, there was an excellent immediate result, but several weeks later the patient returned stating that he had felt a sudden snap in his eye. Upon examination it was found that the tendon had given way and that he had what might be termed a complete traumatic palsy, with a squint which was much greater than it had been originally. This same accident occurred in one of Dr. Zentmayer's cases, while the patient was still in the hospital. A second complication, and one which compelled him to abandon the operation, was the frequency with which a peripheral corneal ulcer opposite the advanced tendon occurred. The first complication undoubtedly was the result of necrosis of the lateral strands; and the second was the result of interference with nutrition of the cornea by the large mass of catgut which is left in place in this method of operating. He understood that this complication also occurs at times after tucking operations.

He stated that the interference with the blood supply cannot explain the results obtained in the several methods that have been spoken of, as it is the tendon alone and not the belly of the muscle which is involved. He believed that our failures result entirely from poor scleral anchorage, resulting in part from the fear of injury to the ciliary body by the needle. Wells, of Boston, made some animal experiments which went to show that even in the most carefully performed operations of this nature, in the great majority of cases the needle either grazed the surface or goes into the outer surface of the ciliary body. Indeed, Denig, about twelve years ago, advised passing sutures obliquely thru the cornea and thru the extreme angle of the anterior chamber. With proper operating room technic we need not fear the results from the needle accidently injuring the ciliary body.

Dr. Luther C. Peter said the tucking operation for squint is not nearly so satisfactory an operation as advancement of the muscle. A carefully performed advancement or resection always yields best and most satisfactory results. If, however, a tucking operation is undertaken, the single suture, as originally practiced, passed thru the center of the muscle, cannot do otherwise than constrict the circulation. Instead of this single suture, more satisfactory results can be obtained by two sutures—one passed thru the upper third, and the other, thru the lower third, leaving the central muscle fibers free.

He had never had a tucking operation to fail, either from constriction of the circulation, or from subsequent slipping of the tendon. While it is an operation which is easy for the beginner to perform, it will not yield the uniformly good results that one should obtain with a Worth advancement.

Dr. Burton Chance protested that the surgical procedures described by Dr. Goldberg and the other speakers are not technically those of Todd's "tucking operation," indeed, certain of the annoying after effects described followed the use of an instrument altogether different from Todd's appliance. Moreover, Dr. Chance stated, Dr. Todd had no such effects following the use of his pronged instrument, because he did not secure the several layers of the muscle by a stout double thread, of rather heavy catgut, inserted in the middle of the folds of tissue, by which the muscle is likely to be strangled. On the contrary, Dr. Todd inserted two threads, one near the upper and one near the lower border, between the prongs of the tucker, and then tied them, thus leaving the middle third uncompressed. Dr. Chance said he used the tucker with satisfac-

tion, yet he does not charge any lack of success he might have had to Dr. Todd's method, as he had not followed the method as Dr. Todd described it.

Dr. S. Lewis Ziegler remarked that Dr. Posey by passing his suture farther back drew the capsule forward, and thus adopted the principle that he had advocated in his capsulo-muscular advancement, only he used a single double armed suture where Dr. Posey used two. The same view was held by de Wecker and Knapp, both of whom included the capsule in their advancement sutures.

Dr. Goldberg was quite right in calling attention to the fact that strangulation and sloughing of the muscle with slipping of the suture were troublesome features that impaired success. His own operation avoided these by utilizing (1) whip-stitch fixation, (2) capsular loop and (3) scleral anchorage. He believed that the crumpling which resulted was better than tucking or folding.

Dr. H. Maxwell Langdon said that the Prince operation was so simple and satisfactory that he thought it should not be neglected. Two sutures, are required, one placed tangent to the cornea about 1 mm. from the limbus for a space about 2 or 3 mm. thru the sclera, the end of the suture being uncut. The conjunctiva and Tenon's capsule are opened and Prince's forceps adjusted to the muscle, which is separated from its scleral insertion. The needle of a single armed suture is passed from within out thru the muscle, capsule and conjunctiva. One end of this suture is then laid across the anchor suture in the sclera and the ends of this suture tied over it as tightly as possible. The muscle and conjunctiva are then grasped with forceps and pulled forward towards the anchor suture; the musculo-conjunctival stitch is then tied, the extra parts of the muscle being resected.

Should there be an under result the stitch may be shortened and should the result be too great the muscle may be allowed to retract before the knot is tied. There seems to be but little change in the after effects of the operation: no matter how tight the anchor stitch is tied the pull on it will contract its intrascleral portion somewhat and turn it into a loop with a smaller intrascleral part allowing about 1/2 to 1 mm. of lengthening for the musculo-conjunctival stitch. The anchor stitch must be tied tightly. The reaction is moderate. The stitches may be removed the fourth or fifth day and the result is usually satisfactory.

Pulsating Exophthalmos.

Dr. G. Oram Ring exhibited a woman with a recurrence of pulsating exophthalmos five years after ligation of the carotid. At the age of two years a deeply seated cyst, at the upper and inner angle of the left orbit, with enlargement of the caruncle, was operated upon by Dr. Wm. F. Norris.

Following this operation, secondary enlargement necessitated another operation, and then there developed a gradual proptosis downward, forward and outward with a distension of the orbital and lid tissues. Ring examined the patient, while she was suffering from a severe attack of influenza. She stated she had had no ocular examinations during a period of thirty-three years. He found an extensive pulsating exophthalmos of the left eye and orbit, associated with a painful exposure keratitis.

A quiescent period of several years had preceded the shock of her father's sudden death, which occurred under very tragic circumstances, just before her admission to the hospital. Following this shock the exophthalmos became so pronounced that complete closure of the lid was impossible. The proptosis carried the corneal pole 17 mm. farther forward than the fellow eye, and 10 mm. below it. There was a marked fulness of the veins of the outer portion of the eyeball. The pupil was dilated. After a few weeks in association with a definite betterment of her systemic condition, the cornea regenerated. She was then seen by Dr. Thomas R. Neilson, who performed a successful ligation of the left common carotid artery. The operation was followed by definite recession of the globe

and by a very considerable lessening of the vessel distension of the orbital tissues, especially above. The upper lid sulcus at the outer half was partially restored. Upon pressure the vessels seemed much softer in consistency and the congeries of orbital veins could be much more easily appreciated. The difficulty in lid closure rather promptly disappeared, as did some numbness in the left side of her face. In addition to the local treatment to the eye, the patient was given six injections at intervals of three days each, in the lumbar region, of 10 c.c. of 2% gelatin. Another period of comparative quiet then ensued and the patient was not seen again for nearly five years. She then returned with exophthalmos somewhat increased from last record. Further notes of her history show she had suffered the dual shock of the departure overseas of her husband, and a severe miscarriage. A third shock still further augmented her oculo-orbital symptoms. Her husband, gassed and shell shocked, returned to America an entirely changed personality, indifferent to marriage ties, callous in moral obligations, a wastrel of money, and in short with a distorted and unnatural perspective of life and its obligations. Hence the picture which she now presents. Her willingness to submit to any further operative interference brings to mind the ligation of the superior ophthalmic or other orbital veins. Enucleation of the eyeball with the application of electrical desiccation to the orbital contents, has been considered, but up to the present the outcome has been regarded as too problematic to justify the risks.

Dr. Stevens reports; the heart normal; the systolic pressure 150, and diastolic 100; a faint systolic bruit is audible slightly above and to the right of the affected eye.

Eye Examinations in Neurotics or Psychoneurotics.

Dr. Hiram Woods, of Baltimore, (by invitation) said the clinical cases of the types referred to have grown more frequent in recent years due in part to conditions induced by the war. Such conditions are mental, moral, economic and industrial. Symptoms are nearly all subjective, and it is difficult to determine what is real and what is not. The eye conditions admit of difference of interpretation. Patients easily grow dissatisfied and suspicious, attribute serious meaning to innocent criticisms, and frequently accuse the oculist of having ruined his or her eyes. The cases detailed came from three sources:

1. Those who came directly because of supposed eyestrain.

2. House patients from the Sheppard and Enoch Pratt Hospital for Mental Diseases.

3. Those referred by physicians who were making an exhaustive search for a cause of a nerve disorder or nerve tire, apparently functional, whether eye symptoms were present or not.

Class 1 complains of pain usually in and behind the eyeballs, and wished to know if pain, anergia, uncertainty, inability to sustain eye work, and loss of power of concentration, were due to need of glasses. Clonic lid spasms, real blepharospasm, were less frequent. Ciliary asthenia and actual visual defects were rare. Such patients frequently inquire if "nervous dyspepsia" and other remote conditions indicated an eye defect. Emphasis was placed upon the importance of the ophthalmologist's role as eye examiner, the case to be referred for systemic study to the physician.

The hospital cases were examined with a view to aiding the alienist in diagnosis and treatment. In this type hysteria, hallucinations and obsessions abounded.

In the third class the entire eye condition was asked, refraction and perimetry being emphasized. Emphasis was placed upon the importance of not asking such patients to detail their own symptoms, the oculist's report to the physician being the essential requirement. This class has usually been diagnosed as neurotics or psychoneurotics.

From a considerable experience with the eye symptoms of these two conditions, it seemed that a careful distinction between them is of more than

academic importance to the ophthalmologist. In both we are dealing with a group of discomforts or abnormal functionings; but they exist, in the one class, neurotic, (in persons without impaired mentality). The extent to which the mind enters into a true neurosis is limited to maladjustment. The person connot adjust himself to conditions at the time or overcome them. The cause is overwhelming, and it must be evident that if it is not removed, the mental maladjustment may become permanent. But if the cause is removed, he gets well, and his neurosis disappears. In the psychoneurotic, on the other hand, there are from the beginning to the end, defective mental powers. Any successful treatment must include not only search for cause, but adaptation of treatment to the mental state. A neurosis, due to some temporary cause, might attack a previously healthy person or a psychoneurotic, but the management of the two cases would have to differ.

Can ophthalmologic symptoms help in differential diagnosis of these two conditions? Dr. Woods thought they can. The eye history before and after the appearance of the neurosis, the previous life and how now hampered, work, happenings about the time of appearance are often helpful; in other words, how the eye trouble came on; then its nature. Pain, lack of concentration, inability to keep up eye work, symptoms usually accompanying certain eye findings, which are more or less curable. With the psychoneurotic there are added mental uncertainty and lack of self reliance. They are brought out, often, in routine examination of visual acuity and field vision.

Such a person leans on somebody else. In reading test types, for instance, he goes along swimmingly to, say, one-half normal acuity, then he comes to a dead standstill. Let him shut his eyes for a moment, and when he opens them, if someone is at the type board pointing with a pencil to the normal line for 20 feet, often he will read correctly. By previous examination with the ophthalmoscope, we know he ought to do so, and with a little help he does. The same uncertainty is shown in field tests. The point of retinal exhaustion is soon reached. Apart from eye examination, the patient's descriptions sometimes lead us to the truth.

Dr. Woods then spoke of some of the eye symptoms classified as evidences of nervous asthenopia, ocular neurosis, etc., and reviewed what was found in systematic study. The results eliminate some of the cases as neuroses; but, all the same, some of them had been so regarded, and the rest were being studied with this diagnosis in view.

Pain. As stated before, the pain was located in the eyeballs. Strictly ocular pains are not, especially characteristic of ametropia; but they are suggestive of other things. One is ocular disease. In three cases sent to him for examination, chronic glaucoma was found, with slight elevation of tension —in the thirties with the Schiötz tonometer—contracted fields and Bjerrum's scotomata. Central vision was normal and refraction error had been, in two of them, properly corrected. The fields had not been taken before, nor had tension been measured. If the bending of the vessels in two of the cases—and in the third it was not very noticeable—had been seen at all, it was not regarded as pathologic. Infected teeth, oral pyorrhea, and sinuitis were uncovered in some other cases.

Dr. Woods discussed with some minuteness the muscular conditions. In the first place, tension ocular pains are pretty characteristic of muscular imbalance. Yet, with the phorometer or Maddox rod, results were often negative or nearly so. Not feeling that myasthenia had been conclusively eliminated, there was used in doubtful cases Duane's shutter or parallax test, the possibility of developing diplopia by a colored glass, and the duction power, in prism degrees, of individual muscles. As is well known, the eyes can exert considerable control in the balance test, but in the short and quick exclusion of the shutter test, with redress, and apparent movement of the object looked at, when the screen is

shifted, it is a safe conclusion that the eye has deviated while under cover. The same is true of diplopia with a red glass. A brief period of wearing a prism with the base toward the suspected muscle, will confirm or remove the suspicion.

As to the power of muscles to overcome prisms, with bases away from them, there is a big difference of opinion as to whether or not it is worth anything. The prism power of the muscles which receive the most attention, generally speaking, the internal recti, give the least valuable information. Power to retain single vision at 6 meters, with prisms bases out, and distance unchanged, is not a test of muscular strength. It is nothing but the patient's power to separate his convergence from accommodation; to make one act while the other is idle. It is what Landolt called "positive relative convergence," just as there is a positive relative accommodation measured by the ability of the ciliary muscle to overcome concave lenses over their distant correction. True both of these functions are of some importance. Abduction and adduction show a close constant relation in normal eyes. Dr. Risley used to say that the proportion between the interni and externi should be, at the minimum, three to one, and that four to one is better. However, exercise of one kind or another can greatly increase a defective adduction in a very short time. This means increased power of action without accommodation, not really increasing strength.

On the other hand, the externi, with their independent nerve supply, can be quite accurately tested. Noyes used to teach that 5° of abduction was a minimum for normal strength and that over 8° was too much. To a somewhat less extent, the vertical muscles can be so measured. A supra—or infraduction of two and a half or three degrees is regarded as normal. These figures either have value or have not. If of no value, and if the balance test is sufficient, the application of them to the subject under discussion is worthless. But in a large number of these patients with definite neurotic eye pains, a general myasthenia, as measured by these duction tests, was found. And opinion regarding the relation of the horizontal muscles to each other should be based more on the prism reaction of the externi than of the interni; and this because the latter act normally in convergence only with accommodation. It is at the near point where we get our best information about the interni. If an essential asthenia of the extrinsic muscles is a fairly constant finding in these neurotics, their pain and lack of endurance can be understood. Because of their weakness, the muscles soon reach the limit of endurance. Two conclusions seem justifiable: (1) This weakness makes the eyes ready victims to any irritation, and (2) this once started, the eyes themselves become a new source of more irritation.

Only a small number of patients presented symptoms referable to the ciliary muscles, save when uncorrected or improperly corrected refraction was presented. Sometimes the near point is abnormally close, and marked benefit follows removing such glasses, and thus removing the near point, and relieving the interni of an added task.

In examination of the fields in these cases, it is absolutely necessary to avoid going beyond the exhaustion line, and being sure that the patient knows what is wanted. When this has been done, there is less variation and practically no interlacing of colors. But in a certain number of patients with neurasthenic symptoms, even when the fields are taken under advantageous conditions, there is a slight but definite and persistent concentric contraction. It rarely is over ten or fifteen degrees. Sometimes it is a little more in one field than another. Has it any significance, specially as regards susceptibility to irritation; in other words, have eyes with this sort of field contraction a tendency to give out sooner under pressure than eyes with normal fields? There is nothing in the appearance of the disc to suggest atrophy; but may there be, with demonstrated loss of peripheral function, a falling of conduction in more centrally located fibers? The observa-

tion suggests the need for careful search for other nerve symptoms, toxemia, etc.

As a rule the pupils were equal in size and presented normal reaction to light and convergence. There were a few cases of inequality, and parodoxic reaction. An interesting observation was the occasional failure of cocain to dilate one or both pupils.

Regarding the lid phenomena in patients classed as neurotics or psychoneurotics, there was frequent occurrence of Gifford's and Rosenbach's signs of hyperthyroidism: the first, difficulty in everting the lids, and the second, a pronounced and persistent trembling of the upper lids when they were closed gently. At the same time, there was no suspicion of Graefe's or Dalrymple's signs.

Regarding treatment, there is not much the ophthalmologist can do; refraction correction should be made, of course. As to the myasthenia, if one muscle is strong, out of proportion to its antagonist, a prism, base toward the weak muscle, may help; but in such cases the balance test usually gives a clue. If the internist, neurologist, or alienist knows when to advise an eye review, the best thing the ophthalmologist can do is to make his diagnosis, advise or give any treatment the eye conditions need, do it quickly and unostentatiously, and then be seen as seldom as possible. His presence centers attention on the eyes and that is just what should be avoided.

It is a question whether benefit is to be derived from periodic health examinations, once or twice a year. So long as one is living up to industrial, domestic or social obligations, and feels well, he or she probably is well. We should bear in mind that it is usually the slight ailments, and not the really serious things which produce neuroses. The cultured woman who has a recurrent breast carcinoma, the conscientious man with chronic nephritis, for whom there can only be one end; the breadwinner suddenly plunged into darkness by an explosion; all these may suffer from the first agonizing realization, but they do not become neurotic. It is the man or woman with some little thing physically, some emotional or industrial irritant, who fall victims. There is nothing like steady work to build up resistence, and no surer way of destroying growth than everlastingly inspecting roots.

Discussion.—Dr. H. F. Hansell said the study of neuroses and pshychoneuroses in relation to their having ocular symptoms is interesting. It reminds one of hysteria and the ocular symptoms induced by that affection. Yet, as Dr. Woods announces, the distinction between the forms of neuroses is important in the diagnosis and treatment of these difficult patients. In the former the patient's mind is concentrated on the eyes, and in the latter the ocular attention given by the patient is the result of a psychic disturbance. He related briefly a case of each kind as illustrating his understanding of this distinction. A woman consulted him concerning her eyes. He found nothing wrong except an uncorrected error of refraction and uncorrected presbyopia, for which he prescribed correcting glasses. She returned from the opticians in an antagonistic frame of mind and stated emphatically and with conviction of truth, that had she chosen the most illfitting pair of glasses in the shop, she could not have selected any that were worse than those ordered. By a rare exercise of diplomacy, she withdrew from the office without physical aid. She returned six months later wearing the glasses with comfort. The cordial relation of physician and patient continued for years afterward.

A young man had been shell shocked in France. He was received months afterward in the Jefferson Hospital and claimed to be entirely blind. No lesion of any kind could be detected in the eyes or the body, and his pupils contracted to light. The upset of his nervous system induced by his experience in France was intensified by domestic difficulties and total destitution. Under treatment and encouragement he regained full acuity of vision. The eyes here responded both to the

imbalance and incoordination of the brain functions, and to their restoration to the normal.

That these phases of mentality do not come only to the uneducated and untrained minds, but to those of experience and intelligence, is illustrated by another case. An engineer, a man of culture and experience, was led to believe by a faking optician that he could not see to read thru the near glass for the right eye, and he demonstrated the truth of his statement to the patient, thus inducing him to buy a $21.00 pair reduced to $3.50. The following morning he could see perfectly well with his old glasses because the vaselin, secretly applied to the right glass, had been removed.

There is, to be sure, a psychic element, almost indeed, a state of hypnosis. The community would invariably rather give credit to the charlatan than to the educated physician. It likes to consider itself advanced and progressive.

The muscular problems described by Dr. Woods are complicated and difficult to handle. For lack of understanding, we try to explain them by referring their causes to a susceptible or hypersensitive nervous system. They are to be found in the same category of cases as those in which a quarter of a diopter of astigmatism causes asthenopia, and its correction temporarily gives relief. After a time the glasses are laid aside, and to them is attributed the cure. In a sense this is true, but only partly, for an individual in good health, free from obsessions and imaginations, needs no such correction. The eye and the environment are not free from responsibility in the etiology.

Dr. Albert C. Buckley said that he was in accord with Dr. Woods' statement, "neuroses so frequently show themselves in eye function because the use of the eyes is so intimately connected with everything in life," and believed, without overemphasizing the matter, Dr. Woods might have added, "because the eye is anatomically and functionally a part of the central nervous system, and therefore more intimately connected with the organ of adjustment of the organism as a whole, so that the ocular mechanism is chiefly concerned in the more important habits of the life of the individual, a receptor of the highest degree of importance from the standpoint of adjustment."

From his experience, he believed a great deal of what would seem to be due to eyestrain, anergia, ocular discomfort, sense of fatigue, visual defect, etc., in profound neurasthenic and psychasthenic states, are symptoms or evidences of diminished attentive power and increased susceptibility to fatigue.

Admitting that there are three distinct types of eyestrain, (1) that due to muscle disorder, (2) nervous innervation and (3) psychic, frequently it is necessary to decide for the patient who is in the convalescent phase of a psychoneurosis, and who complains of eye symptoms, whether he should be sent to the oculist for a new refraction. The inclination is to have the refraction made for comparison with prior tests, but there is some doubt as to whether the patient should wear a change of lenses until he had passed well into an unquestionable convalescence, particularly if there were marked differences in the results of the examination of refraction periods. Puzzling experiences have been with patients who during the height of their disorder have discarded glasses which they had previously worn comfortably, declaring that they could see better without their usual correction. This has been observed especially in patients suffering from mild maniac attacks with mental exaltation.

The first group of patients mentioned are found among the depressive types of psychoses. In the neuroses, in many instances, ocular fatigue and other symptoms are the result of attempts to overcome eye defects.

Dr. Wm. Zentmayer stated the point which Dr. Woods makes in regard to color reversals and interlacing is a useful one. He believed it to be due to lack of concentration and comprehension on the part of the patient. It usually will not be present when the

field is taken a second time. Regarding the part played by the ciliary muscles in these neuroses, it is important to bear in mind that an unequal accommodative power in the two eyes is not at all rare and occasionally requires consideration in the prescribing.

The failure of cocain to dilate the pupils in some of Dr. Woods' patients is probably linked up with the other two symptoms mentioned by him—Gifford's and Rosenbach's—as an evidence of perverted function of the thyroid. This has been noted before.

CHARLES R. HEED, M.D., Clerk.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

April 10th, 1922.

DR. E. B. HECKEL Presiding.

Subhyaloid Hemorrhage in Pregnancy.

DR. EDWARD STIEREN reported the case of Mrs. H. M., aged 32, who appeared November 9th, 1921, complaining of total blindness in her right eye which had come on suddenly five days before. She was three months pregnant, and stated that following a hard day's work she lay down to take a nap. Upon getting up, the vision in right eye was found to be much blurred and steadily became worse.

Pupils in both eyes normal in size and reaction and dilated ad maximum under homatropin. There was no central vision in right eye. Left vision, with plus 1.25 S. combined with plus 0.25 cyl. axis 90°, equalled 6/4.

In the right temporal fundus was a large dark blood clot lying on the retina in front of the vessels, slightly elevated and with sharply outlined margins. The lower part of the clot was dark red, the upper edge being much lighter in color. The upper edge of the clot extended one-half papilla diameter above the macula.

The retinal vessels were normal in both eyes and showed no evidence of sclerosis.

Iodin, gr. 1/12, in spts. aetheris nitrosi, m. xx, three times daily, was ordered and, in addition, saline catharsis every other day.

The patient was not seen again until Dec. 14th, 1921, when she appeared with the ocular condition about the same. In the meantime, she had miscarried and had been confined to bed the greater part of the time.

January 16th, there was no change in the fundus picture. The iodin mixture was increased to gr. 1/10 iodin three times daily, with the salines as before. At no time did urinalysis reveal any abnormality, except an increase in phosphates. Blood and spinal Wassermanns were negative.

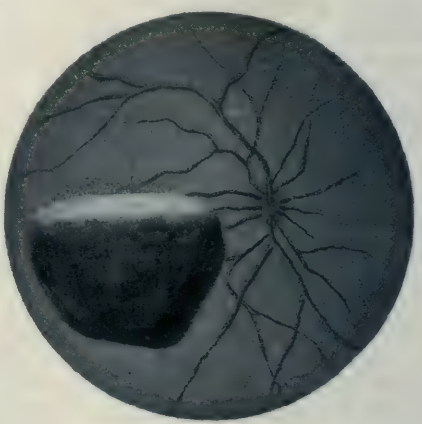

Fig. 1.—Subhyaloid hemorrhage (Stieren's case).

There was very little change in the ocular condition or vision until March 11th, 1922, when the upper part of the clot had receded to the level of the lower margin of the disc, and vision had improved to 3/30. Since then the improvement has been rapid; at the last examination, April 1st, vision restored to 6/5, and the clot was but one-fifth its previous size, consisting now of a dark staining of the retina in the lower temporal region.

Pituitary Tumor.

DR. J. CLYDE MARKEL reported the case of Mr. A. E. W., aged 39, telegraph operator, father of five children. Family history: Father died of tuberculosis when patient was five years old.

Previous medical history: Had measles when a child and influenza two years ago; about seventeen years ago was overcome by heat, but this had no bad effects.

Present illness: About two years ago began to have severe headaches, especially in the right frontal and temporal regions, at times running down into the neck. Lately headaches have been quite severe, coming on almost daily and usually lasting all day. They are relieved by aspirin. In August, 1921, noticed vision of right eye begin to get dim and hazy, gradually getting worse. Has been able to continue work until the present time. Has worn glasses at times, with little or no improvement. Last pair given him was R.—0.75 Sph.; L.—0.75 Cyl. ax 180°. Gives no history of injury at any time; diplopia at times; lately rather frequently. Says he notices one train coming toward him slightly in advance of a second and a little above it.

Is usually quite drowsy and cannot get enough sleep. Tires quite easily, especially going up steps or walking fast. Has short lapses of memory at times. Has been unable to recall names of friends during the past five or six months. Gets quite dizzy at times, especially after stooping over. Complains of severe cramps in legs at night. No convulsions or unconsciousness. Appetie good; no craving for sweets. No anosmia or gustatory symptoms, except bad taste in the morning. No epistaxis. No nausea. Sexual desires are unchanged. Weight 158-163 pounds, with no change recently; height, five feet eight inches; lower teeth good, has upper plate. Fingers tapering; no crescents on nails except thumbs; skin usually dry, except cold clammy sweating of head; no unusual amount of hair on body; urinates frequently; quantity never measured.

Vision: R. 20/200; L. 20/30 ??. Pupils are equal and active to light and accommodation; Wernicke sign questionable. There is some tendency of the right eye to diverge; convergence is very weak. Right palpebral fissure is slightly wider than the left, with possible slight proptosis of the right eye.

Ophthalmoscopic examination shows media clear; discs vertically oval, quite pale and atrophic; no swelling of the disc or edema present. Fields show bitemporal hemianopsia, with obliteration of all color perception except blue (central) in the right; and contraction of the color fields in the left.

Neurologic examination was made by Dr. Geo. J. Wright, who reported as follows: No vertigo or vomiting; gait normal; other cranial nerves normal; arm and knee jerks normal; no astereognosis; no ataxia; station fair; no tremors; face and cornea normal; urine negative. Blood pressure 126; blood Wassermann negative one month ago.

X-ray examination by Dr. G. W. Grier shows a large tumor of the pituitary body. The tumor seems to project downward mostly and has destroyed the floor of the sphenoid sinus and extends into the anterior portions of the sinus. The posterior clinoids are almost totally destroyed.

Discussion.—Dr. Stieren thought the radiographic evidence, in the absence of stereoscopic pictures, insufficient to establish the diagnosis of neoplasm, inasmuch as the percentage of malignant growths in this region is less than 5 per cent. He believed most of such enlargements to be adenopathies, mere compensatory hypertrophies, and suggested the prolonged administration of pituitary gland substance before resorting to surgery. This treatment was successful in his hands in a case of pituitary hypertrophy, previously reported to this Society and published in the 1921 transactions of the American Ophthalmological Society.

Glaucoma?

Dr. Fred C. Stahlman exhibited the case of Mr. L. D., age 28, who came on March 27th, 1922, complaining of the following symptoms: Poor vision; dizziness, brow pain of a dull, heavy nature almost constantly. He was examined by an oculist in June, 1919, who reports as follows: Vision R. 20/200, improved to 20/40 with plus 3.00 Sph. combined with a plus 0.50 cyl. axis 90°; vision L. 20/40, improved to 20/20 by plus 1.50 sph. combined with a plus 0.50 cyl. axis 180°. Patient was told that his eyes were bad, but nothing further. He was examined six weeks ago by another oculist, who told him his right eye was gone and that

the left one was very bad. Patient has been going to the Federal Board for nearly a year on account of his disability, but no record has been made of his eye condition. Present condition: Vision, R., counts fingers at three feet. Tension, 40 by McLean tonometer. Vision, L., 4/15, with plus 1.75 D. sph. combined with plus .75 cyl. axis 180°, equaled 4/9. Tension 35 (McLean). Fields 50° temporal, 50° down, 40° nasal, 25° upward. Right nerve is deeply cupped, with vessels coming up over rim of the nerve. Left nerve less markedly cupped.

Patient gives a history of having been gassed while in combat service. Was confined to the hospital for several weeks, with eyes bandaged; also sustained an injury to the forehead, which was infected. Says he could not see for some time. The question will arise with the Federal Board whether anything in the service has been responsible for the glaucoma. His condition is progressive and demands operative treatment, but the exact procedure has not been decided upon, pending the adjustment with the Federal Board.

Discussion.—Dr. Murdoch thought the case one of optic atrophy rather than glaucoma. Dr. Stieren did not find much loss of nerve substance with the ophthalmoscope. He believes a finding of between 35 and 40 with the McLean tonometer to be within normal limits. He thought the restricted fields might be hysteric. Dr. Weisser did not believe the case one of glaucoma, but thought it should be studied from the standpoint of malingering. Dr. Turner questioned the diagnosis of glaucoma. Dr. Weimer suggested a study of the sphenoids.

Retinitis Pigmentosa or Lues.

Dr. Fred C. Stahlman exhibited the case of Miss B. D., aged 19, who presented herself for examination on March 28th, 1922. Vision began to grow worse at nine years of age. Father says vision was good up to that time. Never had night blindness. An older sister has similar condition, the father reports. Sister's vision began to lessen at about the same age, but father thinks it is better recently. There are four other children in the family, some younger and some older, all of whom have good vision.

Field is reduced to 15° temporal, 15° nasal, 20° downward, and 15° upward. Eyegrounds are dark, both affected nearly equally; nerves paler than normal; retina and all vessels atrophied. The pigment figures lie in front of the retinal vessels, and are of an elongated type, not the bone corpuscle type usually seen; seem to follow course of vessels on periphery. About a year after vision began to lessen, hearing also began to lessen. At first thought there might be specific history, but could elicit none. No blood tests were made. Hearing, loud conversation close. Diagnosis: The fundus picture is that of retinal atrophy. This is due to retinitis pigmentosa, notwithstanding no history of night blindness.

Discussion.—Dr. Markel thought the case one of disseminated choroiditis, and asked for a blood Wassermann.

Dr. Stieren agreed with Dr. Markel, stating that he believed hereditary lues to be the etiologic factor. The condition has come on too early in life to be retinitis pigmentosa, and lacks the typical bone corpuscle pigmentation, as well as the essential symptom of night blindness. Dr. Murdoch's diagnosis was disseminated choroiditis.

Dr. Heckel thought the case one of congenital lues.

Gonorrheal Conjunctivitis.

Dr. Edward B. Heckel exhibited the case of a man, aged 24 years, who presented himself on March 14th, 1922, with a well developed purulent conjunctivitis of the left eye, which began on March 10th. The patient also had an acute urethritis, and is lefthanded. The clinical picture of the left eye was typical of a gonococcic infection. Patient was immediately sent to the hospital. Smears were made of the pus and proved to be positive for gonococci. Some of the pus was cultured, but the cultures failed to grow.

The treatment of this case was iced normal salt solution at intervals of six hours, day and night. The first treatment was at four o'clock on March

14th. The smears taken from the eye were positive for gonococci daily until March 17th, when they were negative, that is, seventy-two hours after the iced normal salt solution was instituted. During the intervals iced pads were used continuously. The iced normal salt solution and the iced pads were used continuously until March 20th, when they were discontinued and a solution of zinc sulphat, grs. 2 to 1/2 ounce, was used at six hour intervals. No other drugs or chemicals were used, except atropin, grs. 2 to 1/2 ounce, which was instilled once daily. The cornea showed some haziness about the fifth day, and on the eighth day there was a break in the corneal epithelium which looked as tho there might develop an ulcer; at this time atropin and dionin were used at six hour intervals. The ulcer has cleared, the thickened conjunctiva has gone down, so that now the eye presents a normal appearance.

Discussion.—Dr. Stieren stated that he has used the treatment outlined by Dr. Heckel in gonorrheal conjunctivitis and subscribes fully to the efficiency of it. He has modified Dr. Heckel's way of applying the iced normal salt solution, by using two quarts of the solution irrigated thru a rubber hose about three inches long attached to a glass uterine irrigator nozzle. This method avoids the discomfort of cold hands for the operator, without any appreciable elevation in the temperature of the solution due to distance from the course of supply.

Occlusion of the Central Retinal Artery.

Dr. Edward B. Heckel exhibited the case of Miss A. C., aged 20 years, who presented herself on March 21st, 1922, complaining that she could not see anything straight ahead with the right eye, but could see objects only to the extreme right. This condition came on suddenly on March 18th. Ophthalmoscopic examination showed occlusion of the central artery of the retina; a distinct white opaque area all about the macula, with a red spot in the macula. The left eye was normal, with vision of 20/20. In the right eye there was only a very slight perception of light to the extreme temporal field.

The patient was referred for general examination. The laboratory findings, including blood Wassermann, were negative; the teeth also were negative. The tonsils, however, showed some pus and were removed on March 30th, 1922. The eye now presents about the same appearance as when first seen. There is no improvement in central vision, but the right temporal field seems slightly larger.

Discussion.—Dr. Stieren thought the ophthalmoscopic picture lacked three cardinal points upon which to make a diagnosis of closure of the central retinal artery, viz., the absence of blood in the superior and inferior branches of the central artery, the blanching of the retina, and the typical cherry-red macula. He saw loss of substance in the nerve head, with the lamina cribrosa showing thru. He thought the mottled appearance present showed a degeneration of the retina around the macula. In a case of this a similar appearance of the macula followed a blow on the head with a crane.

Dr. Weisser thought it difficult to make a positive diagnosis from examination of the present fundus picture alone.

Dr. Markel thought the retina should be blanched and not hyperemic if closure of the central retinal artery had occurred.

Dr. Curry thought the fundus picture not typical of occlusion atrophy.

Complicated Detachment of the Retina.

Dr. Edward B. Heckel exhibited the case of Dr. B. C., aged 66 years, first seen on December 14, 1921, with a history that the left eye had become blind within the previous week. Examination showed the right eye negative; and the left eye to have a large detachment of the retina in the inferior temporal region and extending back to the macula. The rest of the fundus was hazy and edematous and showed some slight fine opacities of the vitreous. The question which naturally arose was whether it was a simple detachment with liquid subretinal contents or a

detachment produced by neoplasm. Transillumination was rather suggestive of neoplasm. The patient was given subconjunctival salt injections. The vision was reduced practically to light perception and it was impossible to obtain any idea of the fields. At the present time, April 7th, the vitreous is decidedly clearer, the fundus is clearer and the detachment not so large or so high.

G. H. Shuman, M.D.,
Secretary.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL SOCIETY.

Meeting of December, 1921.

Strabismus Sursumvergens, Comitant.

Dr. J. M. Banister first saw Mrs. O. G. T. in April, 1917. She manifested a marked upward strabismus of the left eye. In looking straight ahead, the strabismus was directly vertical. In turning the fixing right eye to the right, the strabismic eye would be turned upwards and inwards to an exaggerated degree. Examination under cycloplegia, R. E. V.=20/30—w. + .75D.S=20/20, L. E. V.=20/70—w. + .75D.S⌒+.50 cyl. ax. 90=20/50. There was no paresis of any muscle.

Shortly after this examination he operated upon the strabismic eye with the object of securing a proper cosmetic result, performing the tuck operation with the buried catgut mattress suture upon the inferior rectus muscle of the affected eye. The cosmetic result can be seen in observing the patient. There is no fundus lesion to be detected in this eye with the ophthalmoscope. There is at present no diplopia for distance, altho there is an exophoria of 10 degrees. There is diplopia for the near point, there being a right hypophoria of 6 degrees. There is an excessive degree of insufficiency of covergence for the near point. The patient complains now of a feeling of strain when she uses her eyes in near vision, and desires relief from her present subjective symptoms. He intends to do a tuck in one internal rectus.

Epithelioma of Lid.

Dr. Banister reported Mr. H. C. S., age 34, cashier, suffering from epithelioma of right lower lid. On May 19th, 1921, the lower lid was operated on by a modified Dieffenbach operation. The lid was divided into an anterior and posterior layer at the intermarginal line. The anterior layer was removed by a triangular incision, the base corresponding to the lid border. The line of the basal incision was extended outwards from the outer canthus, allowance being made for shrinking, and from the outer extremity of this incision a second incision was made downward and parallel with the outer margin of the triangle of skin removed, thus forming a quadrilateral flap from the temple and cheek. This flap was dissected up, turned inward on its pedicle, and secured accurately in place to cover the raw triangular surface. The upper margin was united by thru and thru mattress silk sutures to the tarsal cartilage, which had been left intact. The triangular space left by the transplanted flap was covered in by stitching the sides together, no Thiersch graft being used.

The objection to the Dieffenbach operation is the lack of cartilaginous support in consequence of the removal of the tarsal cartilage. In the operation as described, the cartilage is saved thus retaining the support. It is seldom necessary to remove this cartilage as in the earlier stages of the neoplasm it is rarely invaded, and it can safely be spared as indicated.

Discussion.—Dr. H. Gifford.—This is simply a modification of the Dieffenbach operation in which there is some cartilage excised, a small V-shaped section.

Dr. F. S. Owen **asked** whether, in those cases of epithelioma involving the margin of the lid and overlapping onto the conjunctiva, we could do a modified Dieffenbach operation. Cases he has seen nearly always showed an erosion of the lid which extends onto the conjunctiva.

Recurring Conjunctival Tumor.

Dr. L. B. Bushman presented Mr. H. C. C., age 21, whose family history was negative. He entered the hospital

complaining of dimness of vision, with lacrimation and pain in the right eye. He had variola when a child and gonorrhea in the spring of 1921. About ten years ago, while working as a laborer in a mine, he accidently got some sulphur dust in his right eye, which caused a severe infection with pain, photophobia, lacrimation. He remained away from work two weeks. His eyesight was good, and he experienced no pain or any other symptoms at the end of that time. About a year later, he began to notice a growth on the ocular conjunctiva, and this, while small at first, became progressively larger. This did not cause any pain or any other symptom, but five years later it had attained the size of a pea. He had this removed four years ago because of the appearance and because the tumor hindered his vision. He was free from any symptom after removal. Six months later, the tumor began to grow again, this time reaching the size of a hazelnut. About two months ago it began to bleed, averaging once a day, the bleeding being caused by winking. Sometimes the hemorrhage became quite severe. At times, the eye grew worse, he noticed dimness of vision, and pus would accumulate in the eye.

The eye presented a growth about the size of a hazelnut extending out from the external limbus of the right eye. Under anesthesia of 4% cocain, he snipped off a piece of the growth. The patient had quite a profuse hemorrhage which, altho rather severe, was easily controlled by pressure bandage. There were no symptoms of intraocular trouble and no iritis. His vision was quite good and his tension was down. Dr. Bushman was not prepared to give a diagnosis. The interesting feature to him was that the patient had had this growth removed four years ago, after which it began to grow again until it attained the size of a small hazelnut. The dimness of vision he complained of was not due to intraocular trouble but to the fact that the growth extended over onto the cornea and naturally hindered his vision. The eye was perfectly clear so far as the cornea and iris were concerned.

Discussion.—Dr. F. W. Dean.—Would it not have been better to have made an incision thru the conjunctiva and taken the whole thing out instead of cutting the tumor in two.

Dr. C. S. James stated that he and Dr. J. M. Patton also saw this case about two months ago, but that the patient disappeared. They considered it malignant. His vision was then 20/30. Conjunctiva normal. The tumor is possibly a little larger now than it was at that time. He had no pain and his tension was normal.

Dr. H. Gifford.—The fact that it was removed four years ago is a strong argument against its being a malignant growth. He thinks radium would probably cure it without any excision at all, and it may be quite a difficult thing to take it all out. He thinks its removal should be followed by radium.

Glaucoma, Peripheral Iridotomy.

Dr. H. Gifford reported the case of Mr. W., age 52, Jewish, who had been seen ten years before, when his vision was reduced on account of corneal scars but no evidence of glaucoma was found at that time. In November 1921 he returned with a typical history of glaucomatous attacks with pain in the eyes and halos around lights. Tension at that time was 63 in the right eye and 72 mm. Schiötz in the left. Under eserin, this was brought down to 45 in the right and 32 in the left, vision with correction was R. E., 20/100, L. E., 20/30. On Nov. 25, 1921, a Curran's peripheral iridotomy was done on the right eye, following which the tension was reduced to 21 mm. The tension in the right eye remained around 65 mm. and on Dec. 16, 1921, the same operation was done on that eye, the tension being reduced to 27 in the right eye and 24 in the left. Vision was the same and fields showed no noticeable change.

Case II.—M. S., age 62, Jewish. Presented himself on Nov. 23, 1921, complaining of poor vision in both eyes, which had been getting worse for the past six months. Vision with correction R. E., 10/200, L. E., 20/100 + 1. Tension R. E., 68, L. E., 72. The discs were pale and deeply excavated and the anterior chambers were both shallow. On the same day, Dr.

Gifford performed a Curran's peripheral iridotomy which reduced the tension to 11 in the right eye and 17 in the left. Tension remained down after the operation and on Dec. 16, 1921 was R. E., 17; L. E., 20. Vision R. E., 6/200; L. E., 20/70 + 2.

Dr. Gifford states that he had several cases where the tension has kept down for about a year. In other cases, it comes back. It stays down for six or eight months and then, especially if eserin is not kept up, comes back. In the case of one young man who had lost one eye entirely, a trephining was done under cocain. This caused the pupil to dilate and he never could get it back to normal again. His sight went from 20/70 down to counting fingers in two or three days and never came back, altho his tension stayed down to 17. In the other eye, he did an iridectomy and kept the tension down. The tension again came back to 25 in spite of the use of eserin. On using eserin three times a day, tension remained 37. On using it five times a day, it came down to 25 and stayed there. He thinks an iridotomy is safer, especially if the field is narrow, than the trephining. Someone asked why not repeat the iridotomy if the tension went up again. Dr. Gifford replied that he had done this with temporary effect, but he had come to the conclusion that the second iridotomy does not do any more than the first. If the tension comes up after the first operation, it is not worth while doing another.

Discussion.—Dr. Harry Gradle of Chicago said that he was very much interested in the question. He would suggest that Dr. Gifford give a patient uranin and then watch the flow into the anterior chamber. In the summer of 1918, Dr. Walter Parker of Detroit attempted to pick out the cases of glaucoma responding to iridectomy and those responding to trephining, and to establish this on a basis of the depth of the anterior chamber; the shallow chamber calling for the iridectomy and the deep chamber for trephining. The iridectomy and trephining gave about the same result.

Dr. Gradle described an operation of his own which is still in the experimental stage in which he makes an incision back of the ciliary body and turns into this a tongue of conjunctiva which extends thru between the ciliary body and the sclera into the anterior chamber. He had used only this on one blind and painful eye with success in bringing the tension down below normal and relieving the pain. He sterilized the conjunctival flap before burying it by using mercurochrome and mercuric cyanid instillations for several weeks before until the cultures showed a sterile sac.

Dr. H. Gifford discussed the question of preventing late infection. For years it has been his practice to instruct patients who have had a trephining that they should use a collyrium of zinc chlorid one half grain to the ounce twice a day for the remainder of their lives. He mentioned two striking instances where a late infection after trephining had followed soon after neglect in the use of the collyrium.

Glaucoma Simplex.

Dr. G. B. Potter presented the case of Mr. M., age 52, whose family history and previous medical history presented nothing important. He presented himself for examination on account of poor vision in his left eye. His eyes had always been good until twenty years before.

In 1898, while employed on an Iowa farm, he was engaged in cleaning up the yard one day when his rake struck an old rusty nail and something flew into his left eye, causing it to pain considerably at the time. He was seen by the local physician, but doesn't know exactly what was done for the eye. He thinks it was only a few days until the eye was apparently all right. Some few weeks afterward, however, he began to notice what he describes as something like a film coming over the eye. This gradually increased until he can no longer see light. He has had very little pain or discomfort at any time.

Examination of the ears, nose and throat negative. Teeth have all been extracted. Examination by clinician shows aortic arch reaching far over to right, with what he considers an aneurysm of the ascending portion. Blood

pressure: systolic 170, diastolic 95. Wassermann negative.

The eyes are symmetric. Brows rather prominent. Vision in the right eye is 20/25, and with the pinhole is 20/15—1. In the left eye there is no perception of light. Lids and lacrimal apparatus normal. The anterior chamber is rather shallow in the left eye. Cornea and conjunctiva negative. Pupils 3 mm., round, with reaction to light and accommodation in the right. No abnormality in the color or markings of the iris in either eye. The tension in the right eye is 25 and in the left 40 by the Gradle-Schiötz tonometer. Form and color fields, but slightly contracted in the right eye. Lens negative in each eye. Fundus examination, R., some diminution in the caliber of arteries. Veins practically normal. There is a cupping or excavation of the disc on the temporal side occupying about 1/2 the diameter of the disc, with the vessels pushed toward the nasal border. The depth of the cupping is about 1 1/2 mm. The floor of the excavation is quite pale. L. shows an excavation of the entire disc to the depth of 3 mm. at the center, with all the vessels crowded to the nasal side, with arteries thready and veins slightly tortuous and smaller than normal. Diagnosis: Glaucoma simplex.

Discussion.—Dr. H. Gifford. The logical thing to do is to try out the peripheral iridotomy in the blind eye, and if eserin does not hold the tension down in the good eye, try it on that one too.

Treatment of Corneal Abscess.

Dr. J. M. Patton presented a case of a 19 year old boy to show the effect of the Shahan thermophore in the treatment of deep corneal abscesses. The left eye had been inflamed for two weeks. There was no history of previous pain or injury. Vision when first seen was 20/200. The eye presented diffuse infiltration of the deeper layers of the cornea in the lower half. At the outer side, this has a yellowish tinge showing evidently a beginning suppuration. No definite pathology was found in his nose and throat except a moderate amount of pyorrhea and some suspicion of an ethmoiditis. He had improved under the use of heat, atropin and the thermophore.

Discussion.—Dr. Gradle asked what temperature was ued.

Dr. Patton replied that he used 151 degrees centigrade. In the old gas heated machine, he started at 160 and let it run down to 140.

Compensation for Ocular Injuries.

Discussion.—Dr. Harry S. Gradle of Chicago, presented the views of the committee of the A. M. A. Dr. Dean of Council Bluffs, gave an abstract of a report submitted by Dr. Holt of Portland, Maine, which he calls the natural science method of estimating visual defects. The consensus of opinion was that the system was too complicated to be practical and that the element of individual judgment entered into it so much as to prevent exactness.

Dr. J. M. Patton stated that he believed the association should cooperate as much as possible with the committee which has helped us so much to an understanding of this difficult problem, in which it is necessary to give uniform results in examinations.

Mr. Larson of the Nebraska State Compensation Board expressed his appreciation that the profession was attempting to establish a method of recording visual defects. The compensation board has been much handicapped by receiving conflicting reports in a given case by different oculists, who were undoubtedly attempting to give an honest opinion. He brought up the point that certain cases of injury are affected more severely. In recording vision, he says this must be considered by the committee. He also said that many injury cases and their lawyers are inclined to refuse necessary treatment, especially operations, which would aid in restoring sight, preferring to obtain the largest amount of damage rather than restoration of sight. The Board always attempts to see that everything necessary is done in every case, but this attitude makes it difficult at times.

S. R. Gifford,
Secretary.

(*Continued from Page 499*)

Wednesday, April 26, 1922

Subconjunctival Injections of Mercury Cyanid for Trachoma.

Dr. S. Gemblath of Paris. In default of a real specific for trachoma, we have a multitude of methods, medical and surgical, to stop the extension of the morbid process, without making it disappear completely. A condition of their efficacy requires medical applications to be repeated over long periods, months and even years. Surgical procedures are more satisfactory in reducing the duration of the treatment. Unhappily their action is temporary, and they are not without disadvantages. In Prof. de Lapersonne's clinic, all hypopion ulcers are treated by subconjunctival injections of mercury cyanid. A scar results, but it is flat, more or less transparent and the vitality and sensibility of the part is always preserved. Such injections have therefore been advised for trachomatous pannus.

Local anesthesia is secured by 4% cocain solution, and one to two doses of aspirin, 0.5 grain. The cyanid solution is 1 to 1000, 1/3; novocain 1 to 50, 2/3, with two drops of adrenalin solution. Such injections are made once a week, one, two, or three times according to the case. The injection is made slowly; the liquid diffusing itself around the cornea, raising up the conjunctiva. The compress bandage is applied from 12 to 24 hours. The cyanid causes a reaction and the formation of connective tissue, and probably has some bactericidal effect.

In light and recent cases, the pannus and conjunctival lesions disappear and the parts are restored to normal in two weeks. In the oldest and most serious cases, this treatment, combined with the use of copper sulphat, diminishes the length of time required for treatment. Out of 20 cases thus treated, brief accounts of four are given. Two of the patients were Syrians, who had been refused admission to the country in New York on account of trachoma. They returned to Paris, and under this treatment and two weeks use of copper sulphat recovered, so that they were admitted at New York within two months after their rejection.

Hereditary Ocular Degenerations, Ophthalmic Abiotrophies.

E. Treacher Collins (London, England). Most writers on hereditary affections of the eyes have omitted to draw any sharp line of differentiation between those in which the tissue involved has from the first been imperfectly developed, and those in which after full development degeneration sets in. As examples of hereditary maldevelopments may be mentioned such obvious structural imperfections as microphthalmia, ectopia lentis and congenital cataract, also conditions known to us best as functional disturbances, tho doubtless having some anatomic basis, such as congenital color blindness and night blindness. The hereditary ocular degenerations of which the fullest information has been collected include the following affections; postnatal cataract; ocular palsies, retinitis pigmentosa; symmetric macular pigmentary degenerations; amaurotic family idiocy; Leber's optic atrophy; Doyne's "family choroiditis;" nodular and lattice like degenerations of the cornea.

Widely as these affections may at first appear to differ, they will be found to present similar characteristics, which allow of them being grouped together in a classification of eye diseases founded on a pathologic basis. All these diseases are hereditary, in the sense that they may be met with in several siblings of the same generation, and all, with the exception of symmetric macular pigmentary degeneration and amaurotic family idiocy may be met with in several different generations.

The lesions in all these diseases are bilateral, and in none of them in which pathologic investigations have been made, do the findings suggest the presence of inflammation, but are such as

indicate degeneration in certain definite groups of cells; cells, which having reached a full degree of development and functional efficiency, have then undergone degeneration. The time of life at which the degeneration commences varies, as also does what sometimes appears to be the incidental exciting cause. The occurrence of degenerations in several successive generations of the same family renders it impossible to attribute them entirely to the absorption of any exogenous toxic substance, or to the absence of any exogenous essential nutritional material, such as a vitamin.

So far as our knowledge at present goes, there is no endogenous substance, such as the secretion of one of the endocrin glands, upon which the structures involved in these diseases are dependent for their vitality; nor do we as yet know of any toxic material developed endogenously, either by bacteria, or as the outcome of some faulty metabolic process, capable of poisoning and slaying the cells picked out in these diseases. Even if such a toxic, or internal secretion, be discovered, to account for the hereditary nature of the affections, it will still be necessary to assume some innate weakness in the cells attacked; or, in the case of some internal nutrient secretion, some innate tendency to a failure in its supply.

Sir William Gowers accounted for the hereditary character of certain degenerative affections of the nervous system, muscles and epidermal appendages, presenting similar characteristics to these affections, to want of vital force in the structures involved, so that they are unable to maintain their nutrition beyond full development and, therefore, gradually fail and degenerate. They fail, as he says; "from imperfect life, from abiosis, in what may be designated abiotic atrophy, or abiotrophy."

He points out that; "besides general life, the termination of which involves that of every part of the body, many of these parts have their own vitality. Some of them slowly die, while the life of all the rest goes on without impairment. They die from many causes, some early, inevitably, from a very grave defect of vital endurance; some much later, the failure being but slightly premature; and some at various times apparently from various causes. When the failure is early, it is often due purely to a defect in vitality, a defect which seems to be inherent, the tendency thereto inborn. We do not indeed, apply the word 'death' to this slow decay of the elements; we speak of it as 'degeneration,' but the process is in many cases, perhaps in most, an essential failure of vitality, and I think it is instructive to consider the degeneration in this aspect."

The term vital force, in the way in which it is here used may be defined as: "a force the possession of which differentiates living from dead matter." Tho we know little as to its real nature, it is convenient to have a name to apply to it, just as in algebra we use a symbol to represent an unknown quantity. This vital force, as we know it, exists only in connection with cell protoplasm, and manifests itself by what we term irritability. For its maintenance, the cells possessing it require the capacity of taking up certain substances from the fluid media surrounding them, and of discharging other waste products; a process probably capable of a physicochemical explanation.

In fission fungi, and many other unicellular protozoa, the vital force may apparently be indefinitely prolonged, for these simply formed organisms multiply by division, so becoming transformed into two new individuals without leaving corpses behind. In a germ cell of multicellular organisms, as the result of fertilization, the vital force, instead of becoming gradually exhausted and leading to degeneration and death of the cell, regains fresh vigor, causing it to multiply, develop and evolve into a new being.

In the cells of multicellular organisms, which have become much differentiated from germ cells, and have acquired new and highly specialized functions, the vital force is always in a state of transition. These cells are always either in a state of evolution

to maturity, or in a state of involution to decay. At times the process is so slow that it might almost be thought that no change was taking place, but slow tho it be, and minute the alterations that occur, it surely and steadily goes on. "For so we ripe and ripe and then we rot and rot."

The time required for the vital force to complete the cycle of change which takes place from birth to death varies considerably in different species of animals, in different individuals of the same species, and physiologically in the several tissues of which an animal is composed. Amongst mammals, the vital force is of much longer duration in elephants and man than in horses and dogs. Amongst birds it is of much longer duration in parrots and geese, than in fowls and thrushes. In the tortoise it is of longer duration than in any other vertebrate, one such animal having been estimated to have lived for two hundred years.

Amongst human beings, longevity is frequently found to be a family characteristic. Here are three examples: Mrs. Amelia Spurgeon the aunt of the great preacher, recently passed her 102nd birthday. Her mother lived to be 90, and her brother and two sisters all passed the eighties. In a recent copy of a daily paper, there was an account of an octogenarian, a Mr. Gibbins, who had eight brothers and sisters, not one of whom died before reaching the age of 80. Thomas Parr, who was born in Shropshire in 1843, is reported to have reached the age of 152, and was buried in Westminster Abbey. The celebrated Harvey examined his body after death and was unable to discover any organic diseases. Parr did not marry until the age of 88; he had a son who lived until the age of 127.

Physiologically, in the human body, the vital force fails sooner in some tissues than in others; e. g., the thymus gland is highly developed during fetal life, reaches its maximum size during the third year of life, and shows signs of degeneration which rapidly progresses after the age of ten.

Sir James Paget says: "The changes of natural degeneration in advanced life have a direct importance in all pathology, because they may guide us to the interpretation of many similar anomalies which, while they occur in earlier life, we are apt to call diseases, but which are only premature degenerations, and are to be considered therefore, as methods of atrophy—as defects rather than as perversions of the nutritive process—or as diseases, only in consideration of the time of their occurrence." This was written in 1853, and I quote it as an interesting anticipation of Sir William Gowers' theory of "Abiotrophy," or degeneration of tissues due to defective vitality.

Metchnikoff would have us believe that the symptoms we speak of as senile degeneration are not a natural sequence of life, ushering in its close, but the outcome of autointoxication. In his writings, however, he frequently speaks of the cycle of life, and of natural death, which latter he defines as a "phenomenon that is intrinsic in the nature of an organism and not the mere result of an external accident." What apparently he does not recognize, is that the cycle of life may be of variable duration in the different tissues of an individual, and the intrinsic phenomenon "natural death," may take place sooner in some cells in the body than in others. Doubtless, some tissues, in which the cycle is drawing to a close, are likely to succumb to some toxic influence earlier than they otherwise would, in which case, the changes produced might be attributed entirely to the toxins, the weakened resistance power of the tissues having been overlooked.

It is as unreasonable to attribute all variations in the time of degeneration of tissues to toxic influence as it would be to account for all variations in the time of development of tissues to such influences. Just as we sometimes meet with precociousness in development, so sometimes we meet with precociousness in degeneration. It is with some of the prococious degenerations of the tissues of the eye that I now proceed to deal.

HEREDITARY POSTNATAL CATARACT OR ABIOTIC CATARACT.

Under the headings of cutaneous abiotrophy, Sir William Gowers described the early baldness met with in the males of the family in several successive generations, the essential cause of which is the failure of the life of the hair follicles of the scalp. He also spoke of early greyness of the hair as a qualitative failure, an enduring defect of one function of the follicles.

Another very common form of degeneration met with in a structure derived from cuticular epiblast, is opacity of the lens of the eye, the outcome of a premature failure in the vitality of the fibers, a condition which may, I suggest, be aptly termed abiotic cataract. That these changes are due to defective vitality is shown by their inherent character. Nettleship states that: "Postnatal or acquired cataract is often hereditary, and quite a number of pedigrees have been collected by many observers." Such postnatal cataracts have been described according to age of onset as "senile," "presenile," and "juvenile." But as Nettleship says: "this subdivision is, no doubt, arbitrary, and does not correspond with any difference in the cause or character of the cataract; but is often of some practical convenience."

He collected and analyzed a large number of pedigrees of postnatal cataract, and commenting on the age of onset remarked: "In one and the same family, hereditary cataract often begins at about the same age in all who have it. But exceptions to this are very numerous, for, as we have just seen, hereditary cataract often occurs at an earlier age in the children than in the parents; whilst in those of the same generation it frequently begins at about the same age in each."

In 1917 I operated for cataract, at the Moorfields Hospital, on two members of a family of seven. The five other members of the family, and their father, had previously been operated on for cataract at the same hospital. These facts I was able to verify by reference to the inpatient notes. I was further told that my patients' two paternal uncles had been operated on for cataract, one at St. Thomas' Hospital and the other at Cardiff. Of the family of seven, two were males and five were females. Their ages at the time they were operated on were as follows: 42, 56, 48, 63, 56, 58. The age of their father at the time of operation was 60. In a family such as this, in which so large a number of its members became affected with early senile cataract, it seems necessary to assume some inherent defect in the vitality of the lens fibers, which results in their degeneration.

To speak of certain forms of postnatal cataract as abiotic does more than simply describe them as due to degeneration. I propose to show that it enables us to understand their pathology more clearly than has previously been possible. In considering the degenerative processes which occur in the structure of the lens, it is first necessary to recognize that there is a physiologic degeneration constantly taking place in its fibers, which does not result in the formation of opacity, and which, in an anteroposterior section of an adult lens, can be seen in all its stages in passing from the periphery to the nucleus.

Newly formed lens fibers, such as are seen close to the capsule, form long flat bands with regular margins, rounded or hexagonal in transverse section, and containing rounded or elliptical, well staining nuclei. Older fibers, further from the capsule, become denser and flatter; their nuclei show at first an aggregation of chromatin towards the periphery, and later disappear altogether, clear oval spaces being left at the sites they occupied, which, in still other fibers, also disappear. The oldest fibers of all, those in the center of the lens, are harder and more condensed; they have crenated margins, the projections and indentations of which fit tightly into one another, and they are entirely devoid of any trace of nuclei. This gradual hardening of the lens fibers is spoken of as sclerosis.

HEREDITARY OCULAR PALSIES.

In discussing the various forms of hereditary paresis of the muscles of

the eyes and eyelids, it will be first well to quote some of Gowers' remarks on muscular abiotrophy in general. In his first lecture on the subject he wrote as follows:

"In the various forms of idiopathic muscular atrophy, in which there is a primary atrophy of the muscular fibers, we have examples of a true abiosis. To all these primary myopathies it has become customary to apply the term "muscular dystrophy," and the custom is convenient, if not quite accurate. The term thus includes both simple muscular atrophy and its well known congener, pseudohypertrophic paralysis. In these the muscle fibers, after full development, cease to maintain their nutrition. They slowly waste and a larger number, most of them in many parts, all in some, perish."

In another lecture (2) on the same subject he wrote:

"The nutrition of the muscle depends on that of the nerves thru which its its function is called forth. If the nerves slowly degenerate, so does the muscle; if rapidly, from descending irritation, the muscles undergo speedy complete degeneration. Yet the muscle has a life which we may call organic, belonging to it as a structural entity, in consequence of which it may undergo morbid changes, apart from the nervous system, and may fail to live on, tho the nerves preserve an unimpaired vitality. This failure is what I have called muscular abiotrophy—failure of nutrition from defective vitality—and for brevity we call it myopathy."

Amongst the muscular abiotrophies, which he thus defines, he includes the "facio-scapulo-humeral type," also designated the "type of Landouzy-Dejerine." In this affection there is extreme wasting of the muscles picked out, including the orbicularis palpebrarum. No matter how long the duration of the malady, it seems to remain purely muscular, the nervous system, even the motor nerves, remaining unchanged. It is a family and hereditary disease, and may be transmitted by either male or female parent; it affects both boys and girls alike.

In 1915, I showed a girl, aged 7, who had bilateral facial paralysis. At that time there was no affection of the muscles of the shoulder girdle, tho there was some paralysis of the extensor muscles of the leg, causing her to walk with a peculiar gait, her toes turning inward. She had the typical expressionless, socalled myopathic face. She was unable to close her eyes from paralysis of the orbicularis muscles, and her lower lids fell a little away from the eyeballs, causing epiphora. There were no symptoms pointing to any involvement of the nervous system, and the case appeared to be one of purely muscular atrophy.

Fuchs in 1890 reported five cases in which bilateral *ptosis* was the only symptom of disease. In two of them, aged 30, and 60 respectively, the ptosis appeared early in life, was hereditary, and in course of time became complete. The other three, aged 40, 60, and 56 years respectively, developed ptosis late in life; slowly increased and became almost complete. There was no history of syphilis in these cases, and no evidence of brain disease. The upper eyelids were thinned to such an extent that the anterior parts of the eyeball showed plainly thru them. There was also shrinking of the orbital fat in the immediate vicinity of the levator, as shown by falling in of the lid below the orbital rim. Fuchs removed and examined a small portion of the muscle in one of his cases and found the fibers much thinner than those from a healthy muscle; the nuclei were considerably increased in number, and there was marked pigmentary degeneration inside the sarcolemma, but no fatty degeneration was found. In some parts the fibers themselves appeared normal in structure; the connective tissue between them being, however, increased in amount. Fuchs was of opinion that his cases were best explained by a primary atrophy confined to the levator palpebrae muscle, an affection which up to that time had not been described.

In 1909 I published the notes of what I took to be a case similar to those described by Fuchs of bilateral

ptosis, unaccompanied by paralysis of any other muscles. Like all of Fuchs' cases the patient was a female, and like some of his cases, there was a slight amount of ptosis dating either from birth or from early infancy. That the ptosis had steadily increased was well shown by the examination of a series of photographs she had had taken at different ages. At the time she came under my observation she was 69 years old.

W. M. Beaumont published the account of a family in which several members of four different generations suffered from ophthalmoplegia externa. The disease was never congenital, but always appeared in adult life; it was slowly progressive and never appears to have had a fatal determination.

McMullen and Hine mention that Wilbrand and Saenger grouped as a clinical entity certain cases of external ophthalmoplegia which, in their opinion, had definite characteristics. There is a gradual onset, generally in infancy or early childhood, more rarely in later life, of a bilateral progressive paralysis of the external eye muscles, not associated with other signs of disorder of the nervous system, or with fever. The disease may come to a standstill permanently, or for long periods, at any stage of its development, but generally ends in complete, or nearly complete, external ophthalmoplegia. The following case, evidently belonging to the same class, has recently come under my observation:

Frederick R., aged 43, stated that his eyelids began to droop 28 years previously, and that shortly afterward he was operated on for it by Mr. Lawford. His condition was improved but the drooping had persisted. He came to me on account of some conjunctivitis in one of his eyes, and I then discovered that in addition to bilateral ptosis of a very marked degree, he also had ophthalmoplegia externa. He had only very slight power of movement of either eye laterally or vertically, and practically no rotatory movement. His pupils were equal and active, and he had no more defect of accommodation than such as might be expected in a man of his age with a slight degree of hyperopia. His occupation was a carman, he had never experienced any diplopia, or found any difficulty in driving about the crowded streets of London.

Most writers on these hereditary ocular palsies, and on the cases presenting similar symptoms which arise sporadically, regard them as due to lesions in the nuclei of the nerves supplying the affected muscles. It is, however, possible that the primary condition may be a degeneration of the muscle fibers, and that the nerves supplying them may be unaffected. Whichever be the true explanation, seeing that the affection is in some instances an hereditary one, and that it is not due to syphilis, it may appropriately be regarded as of an abiotic nature: either an abiotrophy of the cells of the nerve nuclei, or an abiotrophy of the muscle fibers.

RETINITIS PIGMENTOSA.

Retinitis pigmentosa, should really be regarded as a primary degeneration, or abiotrophy, of the neuroepithelium of the retina. It will be here only necessary to summarize the evidence set out in a previous paper.

Nettleship described the disease as "the result of a tissue liability present, tho seldom manifest, at birth, and known to be so often hereditary that we may be sure it is so also in many cases where the proof is wanting." Wagenmann showed, by division of one of the posterior ciliary arteries in animal eyes, that the nutrition of the outer layers of the retina depends on the choroidal circulation. In the area supplied by the divided vessel, both choroid and retina atrophied, the latter becoming adherent to the former and also pigmented.

Frequently after sclerosis of the choroidal vessels, due either to syphilis or senility, pigmentation of the retina is observed. From this, and from Wagenmann's experiments, it had been inferred that the pigmentation of the retina in retinitis pigmentosa is also due to sclerosis of the choroidal vessels. Pathologic examinations of eyes

in cases of retinitis pigmentosa, at different stages of the disease, and made by different observers, have shown it may occur without any such thickening of the choroidal vessels being present.

The evidence afforded by pathologic investigations seems conclusively to show, that retinitis pigmentosa may arise and exist for many years unaccompanied by any thickening of the choroidal vessels. Further, that the disease starts in the retinal neuroepithelium, which, having attained its full normal development, degenerates. As it is an hereditary condition, this tendency to degenerate must be due to some inherent weakness in the affected cells.

Atrophy of the percipient elements in a sensory organ is necessarily followed by atrophy of the nervous elements in connection with them, and a decrease in the vascular supply to the part. So in the retina in retinitis pigmentosa, following on the atrophy of the rods and cones, there is atrophy of the ganglion cells and other nervous elements in the retina, together with a dwindling of the smaller blood vessels of both the retinal and choroidal circulations.

As often happens, when the highly specialized elements of a structure degenerate, the less highly organized supporting framework of the tissue tends to increase. It will be well for me to quote here what Gowers wrote of the matter in connection with neuronic abiotrophy of the central nervous system, because it applies so well to the retina in retinitis pigmentosa. He says: "Whenever the nerve elements waste, there is always an overgrowth of the interstitial neuroglia, the connecting and supporting tissue which lies between them. This overgrowth may be, indeed, on first inspection, the most conspicuous element, and its aspect has led the process to be termed 'sclerosis.' I say 'its aspect' because there is generally no increase of consistence in the part so changed. This is generally diminished; the interstitial tissue, which looks so fibrous and firm under the microscope, is really softer than the nerve elements that have perished.

"The two elements, the neural and the neuroglial, seem to have a common but inverse vitality; it is in consequence of this that the interstitial tissue overgrows when the nerve elements decay. The overgrowth seems to coincide with the very commencement of the decay, and may be at first the most conspicuous."

The first symptom a patient complains of in retinitis pigmentosa is night blindness; this precedes the appearance of any pigmentation. As Nettleship pointed out the term "retitis pigmentosa sine pigmento usually signifies nothing more than the initial stage of the ordinary disease." The part of the retina first involved is the perimacular zone; a ring scotoma is found to precede any contraction of the periphery of the field. Pigmentation of the retina when it makes its appearance is also first seen in an intermediate zone between the macula and the periphery. It is not until the later stages of the affection that the retinal blood vessels become narrowed, and the optic disc acquires its characteristic waxy appearance.

In the dark adapted eye, the part of the retina which is most sensitive to light is that surrounding the macula. Experiments have shown that its sensibility increases centrifugally with each degree, until 10° to 20° from the fovea where the maximum is reached. On the other side of this maximum, the sensibility decreases toward the periphery in approximately concentric circles. Degeneration of the percipient elements of the retina, in the part most acutely sensitive to light, accounts therefore for the early occurrence of the night blindness.

In a typical case of retinitis pigmentosa, the inner border of the ring scotoma corresponds as a rule to about the 15° to 10° on perimeter charts. That is to say, the part of the retina in which failure of function commences is that in which its neuroepithelium first attains its full development. The macular area, together with the nerve fibers proceeding from it, is both

ontogenetically and phylogenetically of late development.

Pigmentation of the retina is due to the migration of pigment epithelial cells into its substance. The reason why it is such a characteristic feature of the disease we term retinitis pigmentosa is, that the disease commences in the rods and cones; the gaps left in the membrana limitans externa by their disappearance forms tracts thru which the pigment cells can make their way. We know that these pigment epithelial cells physiologically possess the power of ameboid movement. When stimulated by light they throw out filamentous processes between the outer segments of the rods and cones, and on removal of the stimulus retract these processes into the body of the cell. They possess a capacity for positive phototactic movement which is only kept in check by their anatomic relations; when these are altered by the atrophy of the rods and cones, together with the nerve elements of the retina, so that only a network of neuroglial tissue remains, then the pigment epithelial cells, attracted forward by the stimulus of light, are able to make their way into the innermost layers of the retina, where they accumulate in the lymph spaces around the blood vessels and give rise to the characteristic branching patches.

The waxy appearance of the optic disc in retinitis pigmentosa, which is different from that met with in any other affection, is attributable to an overgrowth of its neuroglia. In rare cases hyalin bodies, sometimes in grape like clusters, are seen protruding from the surface of the disc. In microscopic appearance and in their reaction to chemical reagents, these hyalin bodies are found to resemble those so commonly met with on the inner surface of the elastic lamina of the choroid. These latter are due to some perverted activity of the pigment cells—i. e., cells which are derived from the outer layer of the secondary optic vesicle. Cells having a similar embryonic origin are found in connection with supporting neuroglia of the optic nerve. It would seem probable, therefore, that in retinitis pigmentosa, where there is an overgrowth of neuroglia in the optic nerve, the hyalin nodules met with on its surface are due to some perverted activity of the neuroglia cells.

Retinitis pigmentosa is not infrequently associated with other forms of hereditary degenerative conditions, the commonest of these being deafness and idiocy. Nettleship estimated that 33 per cent of persons with retinitis pigmentosa may be deaf, and at least 4 per cent of deaf mutes may have retinitis pigmentosa. The deafness in these cases is always bilateral and is never recovered from. Even when accompanied by dumbness, it may have been acquired, according to Politzer, as late as the age of seven years. The pathologic changes found in the labyrinth of deaf mutes are comparable to those found in the retina in retinitis pigmentosa, and may be summarized as degeneration of the neuroepithelium, atrophy of the nerve fibers and a new formation of fibrous tissue. It is then highly probable, that, as in retinitis pigmentosa the affection being primarily a degeneration of the neuroepithelium, which is hereditary, it should be classed as an abiotrophy.

SYMMETRIC FAMILIAL PIGMENTARY MACULAR DEGENERATION. ABIOTROPHY OF THE CONES AT THE MACULA.

De Wecker, in 1868, divided cases of retinitis pigmentosa into two groups: one with comparatively rapid loss of central vision, frequently associated with mental defects; the other beginning with night blindness early in life, progressing very slowly, the central vision remaining unaffected until late in the disease, with which mental failure is rare. Nettleship also described a typical case of retinitis pigmentosa with central changes. He pointed out that the pigmentation in them was in the form of scattered dots, instead of bone corpuscle shaped patches; and patients instead of being night blind preferred a dull light.

Several cases have been recorded in recent years of primary macular pig-

mentary degeneration, occurring in several members of the same family, often in association with cerebral degeneration, but sometimes without. These cases have been described under the following headings: "Family Cerebral Degeneration with Macular Changes" (Batten and Mayou); "Maculocerebral Degeneration (Familial)" (Oatman); "Progressive Familial Macular Degeneration" (Darier). None of these titles are satisfactory. From the two first it would be inferred that the cerebral changes were an essential part of the disease, and from the third that the disease tended to progress to complete loss of sight. I and others have recorded cases which have manifested no mental symptoms, some of them having been kept under observation for several years. The disease, when it commences at the macula, generally remains confined to that region and does not progress beyond it.

The reason that the pigment patches in retinitis pigmentosa assume a bone corpuscle shape is due to the pigment epithelial cells making their way into the lymphatic sheaths around the retinal blood vessels; as there are no blood vessels in the retina at the macula, when the pigment epithelial cells migrate into the retinal tissue in that region, they do not form branching patches, but rounded dots.

The histologic changes in an eye of a typical case with symmetric pigmentary changes at the macula in each eye have been investigated by Mayou. He found that the sclera and choroid were practically normal, the pathologic changes being confined to the retina. Briefly they consisted of a complete disappearance of the cones and the neural elements of the retina, together with some increase of the supporting neuroglia and light migration of pigment epithelial cells into the outermost layers of the retina. Mayou inclined to the view that the primary change was in the ganglion cells of the retina, and that the disappearance of the cones and the migration of pigment was secondary. Coats wrote very shrewdly: "There is, I believe, no known instance of a disease which first attacks the inner retinal neural elements and then the outer, altho instances of the opposite sequence of events might be cited; nor does destruction of the inner layers from whatever cause produce any consecutive secondary change in the outer, however, long the duration of the lesions, as is exemplified, for instance, in the case of obstruction of the central artery or primary optic atrophy, in which the rods and cones and outer nuclear layer remain permanently intact."

When the general nervous system is affected in connection with this pigmentary degeneration, there is a progressive dementia and paralysis ending in death. After some years of normal development, the mental degeneration sets in, accompanied sometimes by epileptic fits, and before death the patients become noisy, dirty in habits, and develop a spastic condition of the limbs. In two cases examined postmortem by Dr. F. E. Batten, diffuse degenerative changes were visible microscopically, affecting the ganglion cells in the cerebrum, cerebellum and spinal cord. These changes, he says, were similar to those found in amaurotic family idiocy.

FAMILY AMAUROTIC IDIOCY. ABIOTROPHY OF THE GANGLION CELLS OF THE RETINA.

A considerable amount of evidence has accumulated of recent years as to the pathologic changes met with in the nervous system and retina in cases of family amaurotic idiocy.

All writers on the subject agree that there is no evidence of inflammatory changes in the affected parts, and that the disease is due to a primary change in the cells themselves. Gordon Holmes showed that this change was not due to an arrest of their development, or to any bacterial toxin. The essential histologic features of the disease are: Progressive loss of the Nissl substance in all of the neurons of the body, and the increase of the neuroglia fibril substance to an abnormal degree.

The cause of the opacity of the ret-

ina, seen around the macula, in these cases was for some time a matter of uncertainty due to the difficulty in obtaining specimens free from post-mortem changes, and suitably fixed. Within two hours of death changes in the retina set in, causing it to swell, become rucked, and then present microscopically the appearance of edema, or of a hole in the fovea. This edematous change was the most striking feature which I discovered in the first specimen of the sort which was examined microscopically, and I attributed the opacity seen ophthalmoscopically to edema. Since then fresher material has been obtained, fixed in Zenker's solution; sections of which have shown a complete absence of any edema, but well marked changes in the ganglion cell and nerve fiber layers. There can now be no doubt that it is the altered condition of the ganglion cells which give rise to the opacity. Where they are most numerous, around the macula, there the opacity is densest. The changes in the ganglion cells of the retina resemble those found in the ganglion cells of the nervous system elsewhere. At first they appear somewhat swollen, then there is a gradual progressive loss of Nissl substance, followed by the formation of vacuoles in the cytoplasm, and finally shrinkage or disappearance of the cell. As Coats pointed out, the long continuance of the opacity of the retina around the macula may be correlated with the long time the degenerative change in the cells is going on before they finally disappear.

Transverse sections of the optic nerve in advanced cases of amaurotic idiocy, show that the nerve fibers have nearly all disappeared, the few remaining fibers being fine ones and irregular with varicosities.

There is some difference of opinion as to the appropriateness of the use of the term abiotrophy as descriptive of the changes met with in family amaurotic idiocy. Sachs says he gladly accepts it as indicating the nature of the changes met with. Gordon Holmes on the other hand writes: "The cell changes have not the characters of a simple atrophy; in fact they seem to be due to an excessive growth of the protoplasm which later undergoes degenerative changes."

There can be no doubt that the change in the ganglion cell is a form of hereditary ocular degeneration. The degeneration, as I already mentioned, is of a different character, and of slower progress than that which takes place when these cells are deprived suddenly of their nutrient supply by occlusion of the central retinal artery. If, as Mott suggests, the degeneration is in part due to the failure in the inherent specific trophic influence of the nucleus of a nerve cell, upon which the vitality of the whole neuron depends, the term abiotrophy is as appropriate as any that has been invented under which to classify the affection. Even tho the first stage in the trophic disturbance presents the appearance of hypertrophy, the final stage in the process is invariably premature death and atrophy of the affected cell.

HEREDITARY OPTIC ATROPHY.

The occurence of what was termed "amaurosis" in several members of the same family was first described by Beer in 1817. Leber published his classical paper on hereditary optic atrophy in 1871. Many cases of the same description have since been recorded and much has been written on the subject, but so far as I am aware, no pathologic examination has been made of these cases, and we are, therefore, still ignorant as to the real nature of the disease.

Gowers in 1904 described the affection under the heading of "Optic Abiotrophy" and spoke of it as follows: "Since some cases were discerned by Leber, much attention has been given to the form of optic atrophy which occurs in families, sometimes thru more than one generation, soon after adult life is attained. Similar cases occur in sporadic form, isolated, as do other family maladies. The facts suggest that the inherent vital energy of these structures is inadequate to maintain their nutrition much beyond full development, so that they gradually fail and degenerate. They fail from im-

perfect life, from abiosis, in what may be designated abiotic atrophy, or abiotrophy. The same atrophic failure is met with in other parts of the nervous system, as in Friedreich's disease, and conspicuously in the muscles in the varieties of muscular dystrophy.

"It is noteworthy that even vital failure is often associated with extraneous influences. Even in the cases in which the family disposition is most marked, the onset is often the immediate sequel of some adventitious cause.

In 1916, J. H. Fisher put forward a new hypothesis as to its causation. He wrote as follows:

"It has occurred to me that if a disturbance of the pituitary body of temporary duration and moderate degree can be imagined, such a lesion might be adequate to explain the phenomena of Leber's hereditary optic atrophy, in which case the inherited tendency would not lie in a special vulnerability of the macular fibers of the optic nerves, but in a liability of the pituitary body to such limited disorder as I suggest. A priori, it is to me much easier to imagine an inherited tendency to disorder of the hypophysis than a family tendency on the part of the papillomacular fibers of the optic nerve to degenerative or inflammatory attacks."

So far no well recognized case of hereditary optic atrophy has been known to develop bitemporal hemianopsia, and we do not know of any hereditary form of pituitary disease: whereas we are all well acquainted with bilateral degenerative conditions affecting the nervous system, such as Friedreich's disease, due to atrophy of the motor neurons, a typical abiotrophy. It would seem well, therefore, to consider how Gowers' theory of abiotrophy applied to Leber's optic atrophy might account for changes in the vicinity of the sella turcica, such as are revealed by X-ray examination. Gowers, as quoted above, speaks of overgrowth of neuroglia in the optic nerve in Leber's disease; this is not the result of direct observation, as the optic nerves in this affection have not yet been examined pathologically. He must have inferred the presence of such overgrowth in the nervous system in other forms of abiotrophy. There is, however, ophthalmoscopic evidence which affords support to the view, that associated with atrophy of the nerve elements in this disease, there takes place an excessive formation of neuroglia. After the disease has been in existence for some time, pallor of the outer half of the disc commences, and spreads over its whole surface. Leber himself described this pallor as due to increase of connective tissue elements of the nerve. If then there is an overgrowth of neuroglia at the head of the nerve in this disease, we may be sure that there is also a similar overgrowth along the track of the papillomacular fibers elsewhere. The greatest thickening of the neuroglia would be expected to occur where the affected fibers in the two nerves come together, as at the chiasma. A thickening of the chiasma, due to overgrowth of neuroglia might press down the pituitary body, just as an enlargement of the latter may press up the chiasm. A thickening of the chiasm might also, in a skiagram of the sella turcica give rise to the appearance of a root like covering to it, or of a bean shaped body overlying it.

All these speculations as to the real nature of hereditary optic atrophy might be cleared up by the pathologic examination of a typical case. The best way to make known the urgent need of pathologic evidence of this description is, I think, to proclaim it to the members of a large congress, such as this.

DOYNE'S FAMILY CHOROIDITIS, ABIOTROPHY OF RETINAL PIGMENT EPITHELIUM.

R. W. Doyne described a form of family choroiditis in 1899 and 1910. In his last communication concerning it, he summarizes the condition as follows: "It first appears in early adult life, but much more commonly later. It may affect either the disc neighborhood, or the macula neighborhood, or the disc-macula area. It consists of circular patches of exudation; these increase during middle age, and at least set up some irritation and pigmentary disturbance, for tho pigment is not always present, in some cases there is

a good deal to be seen. During this stage the sight, tho affected, is not so grossly interfered with. In old age the condition passes into atrophy, with a corresponding degree of failure of sight."

He had met with the condition in two families, affecting several members in each, in the same and in different generations. A similar condition, in the members of another family, a mother and two daughters, was described by Major Mould in 1910.

At the conclusion of his communication in 1910, Doyne wrote: "I am keeping my attention carefully on some of the older cases, and I hope, if I live long enough, to be able to bring before the society some microscopic sections." Doyne's health failed him in 1913, so that he had to retire from practice, but that year one of the elderly patients with this affection, whom he had been keeping under observation died, and he obtained the backs of his eyes, which he handed over to me for pathologic examination. In making the examination, I had no preconceived notion or theory as to what the condition was, and wrote the following description of the histologic appearances which the specimen presented. Mr. Doyne showed the specimen at the Oxford Ophthalmological Congress in 1913, and the description of it was published in that year, and to this description of the appearance of the sections I, in 1913, added the following remarks: "The hyalin substance in these sections presents the same histologic appearances and staining reactions, as the nodules of hyalin commonly met with in a similar situation in many degenerative conditions of the choroid. Such nodules are often termed "Drusen." The hyalin continuous substance in this specimen is peculiar in forming such a layer. In other conditions it is usually in the form of isolated nodules. The ophthalmoscopic changes, known as Tay's choroiditis, are generally regarded as being due to such nodules. Many different views have been put forward to account for the formation of these hyalin nodules. They have the same characteristics as the elastic lamina of the choroid, and it seems probable that they are, like it, the product of the pigment epithelial cells. Some of the hyalin tissues in this specimen looks very like a number of superimposed layers of the elastic lamina. Further it seems likely that the primary change was in the pigment epithelium, and that the changes in the choroid and retina around are secondary to the pressure caused by the formation of the hyalin substance."

From the above description of pathologic appearances and remarks, it will be seen, that in this family affection first described by Doyne we have to do with a primary degeneration of the cells derived from the outer layer of the secondary optic vesicle, and not the inflammatory affection of the choroid. The white appearance seen in the fundus ophthalmoscopically, is not due to an inflammatory exudation, but to the formation of hyalin substance by the cells involved, which is on their part a degenerative process. A degeneration of this nature handed down from one generation to another, and affecting several members of the same family, may I suggest, be aptly included in the class of affections described by Gowers as abiotrophies.

The affection is, I think, one more commonly met with than the scant attention it so far has received in ophthalmic literature might lead one to suspect. The slow progress of the affection, and the absence of symptoms in its early stages, render its family nature likely to be overlooked. As pointed out by Gowers, tho abiotrophies are usually hereditary conditions, sporadic cases of the same nature sometimes occur. So it is in this hyalin degeneration of the pigment epithelium of the retina. This year I have seen two cases in which the condition was well marked, tho no history of failure of sight in other members of their families could be obtained. From what Doyne has said it is evident that the absence of a history of heredity is not sufficient evidence to exclude the presence of the disease, as it may be present in others of the same family, tho unsuspected for many years.

HEREDITARY DEGENERATION OF THE CORNEA.

A bilateral affection of the cornea, starting usually about puberty, and manifesting itself by the formation of opaque nodules in the superficial layers, was first described by Groenouw in 1898. His description of the appearance in his two cases remains substantially true for the many others which have since been recorded. He says: "The disease consists in the development of numerous small, rounded or irregularly discrete opacities in the otherwise clear cornea. The larger opacities attain to a diameter of nearly 1/4 mm., and between these lie much smaller, dustlike points; they, for the most part, are situated in the central region of the cornea, and rather avoid the marginal zone. The larger spots slightly raise the epithelium, and thus give a certain minute irregularity to the surface. The opacities appear by degrees, without any inflammatory reaction, and may remain for years unchanged."

The hereditary nature of the affection does not seem at first to have been noted. In 1901 Marcus Gunn recorded 4 cases in a family of ten. Spicer, in 1904 described a family in which 3 generations were affected. I give the pedigree of a family, some of the members of which I have had under my own observation, in which four generations were affected. In none of the cases recorded has there been any evidence to show that the affection was of a syphilitic nature. Several observers have described the histologic appearance of small pieces of the cornea, either scraped off the surface or trephined. Paderstein had the opportunity of examining the whole eye in a case, it having been removed after death from a patient who died from suppurative meningitis following an injury to the head.

The changes found are situated in the basal cells of the epithelium, between the epithelium and Bowman's membrane, in Bowman's membrane itself, and in the superficial layers of the parenchymatous tissue of the cornea. Paderstein said that on first looking at the specimens one gets the impression that the disease affects primarily Bowman's membrane; closer inspection, however, shows that the primary seat of the disease is in the basal epithelium. He considers that thru a degenerative process, taking place in the epithelial cells, the nucleus is destroyed and the protoplasm changed into a hyaloid substance. This hyalin substance tends to accumulate on the surface of Bowman's membrane. Fuchs in his most recent article on the subject, states that "The main points are that in this affection two primary changes are present, i. e., the deposition of a substance that is often in layers immediately under the epithelium, and gives an acidophile reaction, and a second basophile, granular substance in the cornea proper." He is inclined to think that the acidophile is a later product than the basophile substance, since the latter has been found in all the reported cases, while the former has not always been present. He describes as accessory changes the alteration in the epithelium, the thinning destruction of Bowman's membrane and the separation, swelling or destruction of the corneal lamellae. Fuchs considers the affection to be of the nature of a dystrophy, and comparable to other similar processes found in old age, as the result of disturbance of general nutrition, or as a result of interference with the internal secretion of certain glands as in myxedema.

Besides the nodular opacities, above described, hereditary degeneration of the cornea may take on the appearance of a trellis work, or latticelike opacity, confined, as in the nodular variety, to the central part of the cornea and to its anterior layers. The hereditary nature of the affection was first pointed out by Haab, who met with it in a lad aged 16, and also in his maternal aunt and uncle. Dimmer recorded three cases in two brothers and a sister. Freund described 15 cases in two families, 7 in one, and 8 in the other, in four generations.

That the two forms of hereditary degeneration of the cornea, the nodular and the latticelike, are really not different but are manifestations of the same affection, was demonstrated by

Doyne and Stephenson, who wrote as follows: "The two diseases then, agree in several particulars; as, for example, that they begin at about the period of puberty; that they are accompanied by insignificant signs of inflammation; that they are slowly progressive; that they probably represent not an inflammatory, but a degenerative process. Then lastly, there is the fact that the sensitiveness of the cornea, particularly as regards the central region, may be impaired, and finally, that both conditions tend to run in families." They record seven cases of bilateral central degeneration of the cornea in three generations of a family; in some of these cases the disease belonged to the latticelike and in others to the nodular variety.

It will be seen, then, that these degenerative, bilateral diseases of the cornea belong to the same class of ocular affections as those already described in this paper; and correspond with those degenerations met with in other parts of the body, attributed by Gowers to a premature loss of vital force, or abiotrophy. The pathologic investigations which have been made, tho enabling us to classify the disease as a degeneration do not supply us with sufficiently definite evidence to determine in which structure of the cornea the degeneration primarily starts. Two points in the clinical history of these affections suggest that possibly the nerves of the cornea might be the primary seat of the disease. Fuchs, in describing his nodular cases spoke of the superficial sensitiveness of the cornea being lessened. Jacqueau described a family in which eight cases of latticelike variety were met with, and in whom the sensibility of the cornea to touch was diminished.

It would seem most probable that an opacity occurring in a number of different cases in the form of a meshwork the lines composing which, by focal illumination, look like glass threads (Haab), or birch twig—like branches radiating from the periphery toward the centers (Freund), must have some anatomic basis. It is clear from the description of the cases, that these lines do not represent tracts left by blood vessels. In no stage of the disease does the cornea become vascularized, and its peripheral parts always remain clear and free from lines. Any tracts left by blood vessels would necessarily extend out to the margin of the cornea, to join the vessels from which they were originally derived. The only other anatomic structure we know of in the cornea presenting the appearance of branching lines is its nerve fibers.

A comparison of the description of the corneal nerves with the distribution of the opacities in the cases of hereditary degeneration of the cornea suggests such similarity of arrangement. The nerve fibers form a plexus in the anterior layers of the substantia propria and a subepithelial plexus, and terminate in end organs situated among the epithelial cells. In hereditary degeneration, the pathologic changes are found in the same situation. The central part of the fundamental plexus, and of the subepithelial plexus, which latter is constituted of fibers derived from the former, take their origin from different nerve trunks to those from which the peripheral parts of these plexuses proceed. Hereditary degeneration of the cornea is confined to the central part and there also anesthesia is noted to have been most marked, i. e., in a region which receives its nerve supply from one set of nerves. The fundamental plexus is composed of a network of fibers crossing and intersecting one another, similar in appearance to the arrangement of the lines of opacity met with in the latticelike type of hereditary degeneration of the cornea.

In hereditary degeneration of nervous structures in other parts of the body, associated with the atrophy of the nervous tissue, there are always changes in the surrounding supportporting fibrous tissue. If then, as I suggest, this hereditary degeneration of the cornea is a primary dystrophy of its nerve fibers and nerve end organs, then we should expect to meet with thickening of the neuroglia tissue surrounding the nerves, some hyalin degeneration in it, and a formation of spaces filled with coagulum representing those previously filled by the nerve tissue. These changes resemble those

which have been described as met with in cases of nodular degeneration of the cornea. It is possible that the different appearances in the arrangement of the opacity, which has been met with clinically in these diseases, may be accounted for by a difference in the part of the nervous system of the cornea which is primarily attacked. For instance, if it started in the fundamental plexus in the substantia propria, we should expect the opacity in the first instance to be of the latticelike variety, whereas, if it started in the end organs in the epithelium, we should expect it to start in the form of opaque dots or nodules.

For any final decision as to the primary seat of this disease further research is necessary. I would suggest that the employment of Dogiel's method of methylen blue staining to a fragment of an affected cornea, removed either by scraping or by trephining, might be of considerable assistance in clearing up the problem.

TREATMENT OF ABIOTROPHIES.

In dealing with the treatment of these various forms of hereditary ocular degeneration, it is first well to point out that a medical man is called upon to certify that life is extinct, as well as to prescribe remedies for various ailments. Every medical student has to learn the signs of death in an individual, so it is well for an ophthalmic surgeon to learn to recognize the signs of death in a tissue of that organ of the body with which he specially deals.

The recognition that these maladies are due to premature death of the tissues involved, does not offer much hope for their alleviation by therapeutic measures. It may, however, save us from trying to revivify dead matter by iodid of potassium, vapor baths, or other measures of that description, which only raise illusive hopes in our patients, cause needless expenditure of money on their part, and are doomed to failure.

Bichat defined life as "the sum of the forces which resist death," and tho, like all other definitions of life which have been attempted, it leaves something to be desired, it is useful in connection with the subject now under discussion. One of the forces which resist death is inherent, and varies in its duration and degree. Tho at some future time it may be accounted for by physicochemical changes, at present we know too little concerning it to attempt to control it. Other forces which resist death are connected with the environment of the organism or of its tissues. It is essential that it should have an adequate and suitable supply of nutrient material. If the vital force in a tissue is inherently weak, the adequate supply of suitable material may delay its final extinction; which, on the other hand might be accelerated by the presence of toxic substances in the fluids in which the tissue is bathed. In these hereditary degenerations, to delay the failure of vital force by maintenance of nutrition, and to remove any source of toxemia, is all we can hope to effect by medicinal measures. In some of the affections dealt with, operative procedures may alleviate some of the inconvenience caused by them. Thus abiotic cataracts can be removed and the sight restored. In bilateral ptosis, the removal of a strip of the tarsal plate will do away with much of the discomfort which drooping of the eyelid gives rise to. In cases of retinitis pigmentosa trephining operations, by producing a state of hypotony, have caused dilatation of the retinal vessels, and tended to delay the atrophic process. In some cases of nodular opacity of the cornea, its anterior layers have been scraped away or excised by a trephine, with some slight improvement of sight.

COLORADO CONGRESS.

The Eighth Colorado Congress of Ophthalmology and Oto-Laryngology will be held in Denver, July 28th and 29th, 1922. Titles of papers offered and requests for copies of the program of the Congress should be sent to the secretaries. All members of the medical profession interested in these special branches are invited to attend and take part in the meeting.

JAMES M. SHIELDS, Ophthalmology,
M. D. BROWN, Oto-Laryngology,
Secretaries.

GRADUATE STUDY IN OPHTHALMOLOGY AT VIENNA.

The special course here outlined was arranged at the suggestion of Prof. Ernst Fuchs, who during his present visit has come into close touch with the plans for graduate instruction in ophthalmology that have recently been developed in the United States. It will be of particular interest at this time because it offers a combination of the enormous clinical advantages of Vienna with intensive systematic instruction by some of the best teachers of ophthalmology in the world.

The present financial disorders, and particularly the high exchange value of the British pound sterling and the American dollar, make it possible for students from English speaking countries to secure the services of the best teachers in Vienna to an extent hitherto unknown. The opportunity is one that cannot be expected to continue indefinitely. For the progress of ophthalmology thruout the world, it is to be hoped that the limited class, that can be formed to take this course, will be so speedily filled that similar courses will be available in future, both in Vienna and in other great medical centers. E. J.

SPECIAL COURSE.

The undersigned beg to announce the establishment of a special course for postgraduate study in ophthalmology, to be given during eight weeks between October 2nd and November 25th, 1922, at Eye Clinics I and II of the Allgemeines Krankenhaus, Vienna.

Prof. Meller and Prof. Dimmer, chiefs of the clinics have consented to active participation. In addition Dr. Bachstez, and Dr. Lindner and Dr. Guist of the II Eye Clinic will give courses. Dr. Hirsch and Dr. Kummer will lecture on the hypophysis and on radium in relation to the eye. The entire material of both clinics will be at the disposal of the staff for the purposes of instruction and demonstration. The course has been so arranged, that in the two months period the field can be covered in quite a systematic and fairly comprehensive way. A weekly colloquium, attended by all members of the staff and class, will provide for an exchange of opinion and of discussion.

The entire course will be in English. The fee will be $200.00. Application with certified check, or draft in dollars to the amount of $50.00, should be in the hands of Dr. Adalbert Fuchs, I Augenklinik, IX, Alserstrasse 4, Vienna, by August 15th. The course will be given for a minimum of ten, and a maximum of fifteen members. As early application as possible is therefore advisable. The detailed plan of the course follows:

	Hours
Hofrat Dimmer—Photography of Fundus	2
Prof. Meller—Operations	30
Prof. Meller—General Diagnostics	10
Doz. Lauber—Physiology and Optics	20
Doz. Lauber—Examinations (Red Free Light, Slit Lamp)	28
Doz. Lindner—Refraction	20
Doz. Lindner—Bacteriology	20
Doz. Lindner—Retinoscopy	8
Doz. Hirsch—Hypophysis	2
Doz. Kummer—Radium Therapy	1
Doz. Bachstez—Muscles	20
Doz. Bachstez—Neurology	8
Doz. Bachstez—External Diseases	28
Doz. Fuchs—Anatomy of the Orbit	8
Doz. Fuchs—Normal Histology	10
Doz. Fuchs—Pathologic Histology	30
Doz. Fuchs—General Therapeutics and local Anesthetics	3
Dr. Guist—Ophthalmoscopy	40
Doz. A. Fuchs and Doz. Linder—Colloquium, one evening each week.	

The daily arrangement of hours will be:

Morning—

9-10. Lindner, refraction and later bacteriology. Hirsch on the Hypophysis. Dimmer, Photography, and Fuchs, Anesthetics.

10-11. Lauber, Physiologic Optics, and later examinations with red free light and the slit lamp.

11-12. Baschstez, External diseases of the eye, and later the Ocular muscles.

12-1. Operations in both clinics.

Afternoon—

3-4. Guist, Ophthalmoscopy, and later Lindner, Retinoscopy.

4-5. Fuchs, Anatomy of the Orbit, and later Normal Histology and Pathologic Anatomy and Histology.

5-6. Meller, Operations and later General Diagnosis, and Bachstez on Neurology.

An hour on Radium will be given by Dr. Kummer November 8th, between 6 and 7; and on Thursday evening of each week the colloquium will be held under the leadership of Drs. Lindner and A. Fuchs.

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JEAN MATTESON, Room 1209, 7 West Madison Street, Chicago, Ill.

RETINAL LIPEMIA.

The thoracic duct pours its current of emulsified fat into the general blood stream after every meal. The appearance of the lymph vessels that collect this fluid from the intestines caused them to be called the "lacteals." The general appearance of the blood vessels in some of the lower animals is visibly modified by the fat content of the blood. The proportion of fat in the normal blood has been studied by methods of chemical analysis. But between these facts of physiology and the ophthalmoscopic examination of the appearances excess of blood fat may cause in the eye, there is a wide gap in our knowledge of lipemia.

Its presence was first observed with the ophthalmoscope by Heyl, of Philadelphia in 1879, who next year read a paper about it at the American Ophthalmological Society. Since then it has figured from time to time in ophthalmic literature; always as a symptom of diabetes mellitus, until the paper by Wagener in this number, in which the second case suggests other possible pathologic relations. It is possible that Heyl's first case had some pathologic condition not usually associated with diabetes, for his paper speculates at length on the mechanism of the apparent widening of the veins, and the general features of his case are not well reported.

The notices of lipemia in the textbooks are still very scanty and defective. They generally mention its bad prognostic significance, an opinion we may have to revise, when it comes to be more generally looked for and better understood. Greeff speaks of it as occurring in young diabetics shortly before the fatal termination. Such cases, marked by acidosis and diabetic coma, are those in which it has commonly been looked for. But Wagener's cases and the one reported by Hunter McGuire at the recent meeting of the American Ophthalmological Society bring out the fact that such patients may regain comparatively good health, and, from what we know of diabetes, presumably may remain in comparatively good health for years.

The suggestion, that lipemia may be transient, rather than rare, is worthy of particular attention. The condition should be borne in mind and looked for in patients who have shown evidences of disturbed metabolism. It certainly

has no such baleful significance as acidosis. The normal fat content of the blood varies from 1 to 2 per cent. The appearances recognized as indicating lipemia have been noted when the proportion rose above 4 per cent; and have quickly disappeared when it dropped below that. In other words, the appearances then came within the limits of what we recognize as normal. May it not be that variations of the fundus color and the appearances of the retinal vessels, that we admit as normal, may to some extent be due to variations in the fat content of the blood?

Widal, Weill and Leplat found increased fat in the blood in connection with the toxic retinitis of pregnancy. The extreme variations from the normal that have heretofore been reported are illustrated by Koellner's case in which were found 26 per cent of fat that could be extracted by ether and 2 per cent of cholesterin.

The ophthalmoscopic picture of lipemia, when fully developed, is a very striking one. The general color of the fundus is altered by the change in color of the choroidal blood supply, altho the thick visible vessels of the choroid do not show the changes noted in the retinal vessels. In the latter the larger trunks are abnormally pale and yellowish; and as the branches grow smaller they become salmon pink, cream color and even white. The arteries and veins are indistinguishable in color, the differences in hue from oxidation being entirely concealed in the milky emulsion in which the red corpuscles are suspended. The widening of the veins seen in some cases is not present in others. This supports the idea that pathologic changes, apart from the increase of blood fat, enter into the etiology of these cases.

E. J.

THE PUPIL AND VISUAL ACUITY.

The iris is spoken of as the diaphragm of the eye, its function being to exclude unfocused or imperfectly focused light; the opening in it—the pupil—as admitting, and by its size regulating the amount of light entering the eye, to what is needed for the best vision. The relation of the pupil to the acuteness of vision is, however, more complex than is often supposed.

The size of the pupil determines: (1) The amount of focused light entering the eye; or more exactly the amount of light that takes part in forming the retinal image, whether this is perfectly focused or not. (2) The size of the circles of diffusion formed on the retina in ametropia, or when the eye is not perfectly focused for the distance from which the light comes. For a given amount of ametropia the size of the circle of diffusion is directly proportioned to the size of the pupil. (3) The pupil generally admits light only thru the part of the dioptric surfaces of the eye capable of focusing it most perfectly and hence of affording the highest acuity of vision.

The amount of light admitted to form the retinal image determines the absolute brightness of the image. The relative brightness of the retinal image depends on the proportion of this light entering the pupil, to the total of light reaching the retina in other ways. For it should be remembered that the light entering the pupil is ordinarily but a small part of the light reaching the retina. None of the tissues of the body is entirely impervious to light. The amount of light reaching the retina thru the lids, sclera and iris is always relatively large, and some comes even thru the bony walls and deep tissues of the orbit.

(1) When, in comparative darkness very little light reaches the retina thru other channels, the enlargement of the pupil, increasing the proportion of light that takes part in forming the retinal image, is most effective in keeping up the visual acuity. Under these conditions the amount of light is far more important than its perfect focusing. So the pupil dilates to admit this light whether the eye is capable of focusing it perfectly or not. On the other hand there is a maximum intensity of the light impression for purposes of good vision. Increase of light beyond this leaves the retina

damaged, so that it is less capable of high visual acuity. To guard against such excess the pupil contracts under the light stimulus. It is probable that the unfocused light reaching the retina thru the lids, sclera and iris, of the normal eye, is never intense enough to damage the retina, altho its large relative amount may lessen the vividness of the impression made by focused light on which visual acuity depends.

(2) The relation of the size of the pupil to the size of the circles of diffusion and the relation of the circles of diffusion to the distinctness of the image is generally understood. These relations may be studied by observing the image on the ground glass at the back of a camera; and the effect on this image of changing the position of the ground glass with reference to the focus of the lens and of changing the size of the aperture in the "iris diaphragm." The effect of the "pin hole disk" on the vision in any case of high ametropia; and the method of thus making the distinction between lowered vision due to ametropia and that due to other causes, are matters of common knowledge among those who correct errors of refraction. Thorington suggested a scale by which an approximate estimate of the degree of ametropia could be made from the visual acuity obtained with the dilated pupil under cycloplegia.

The optical difference between the central part of the pupil, what the writer has called the "visual zone," and the periphery of the dilated pupil has not generally been recognized. Those who have watched the pupil in skiascopy, and have thought about the different movements of the light and shadow that were going on in different parts of the pupil, have come to understand this. Gullstrand before the Washington International Congress called attention to this in connection with "centric ophthalmoscopy" and "centric photography" of the fundus (see A. J. O. for June, 492). Generally the visual zone of the pupil, the area of most perfect refraction, is about 4 mm. in diameter and presents about the same state of refraction thruout its whole area. But sometimes the refraction begins to alter almost as soon as the center of the pupil is departed from; and in these eyes such variations may affect the visual acuity, and the comfort of using the eyes with comparatively small pupils, and slight variations in the pupillary diameter, such as occur under ordinary illumination and use of the eyes.

In a general way these relations of the pupil conditions to visual acuity are known. But there is a lack of exact observations of what occurs in concrete cases; which would give more definiteness and practical significance to the part the pupil takes in modifying visual acuity.

E. J.

BOOK NOTICES.

Transactions of the Luzerne County Medical Society, for 1920 and 1921, Vol. 22, pages 320.

This volume interests the ophthalmologist because the editor is a well known colleague, Lewis H. Taylor, of Wilkes-Barre, Pa., who was Chairman of the Section of Ophthalmology of the American Medical Association in 1905-06. The specialist in a small city is likely to have few professional associates who are interested in his line of work, and may well overlook the opportunity that lies close at hand for taking up a service to his profession, that the busy family physician and the general surgeon are only too certain to neglect. Beside being Editor, Dr. Taylor is Chairman of the Library Committee of the Society; and under his care a medical library has developed superior in completeness to that of any other city of the size of Wilkes-Barre (60,000) in the country.

This volume contains 39 papers which rank well with those published from any county medical society in America, for scientific value and practical interest. Those relating to ophthalmology are noticed under appropriate headings in Current Literature; one by Dr. Taylor on "Some Old Books and Their Owners" deals with some volumes that have recently been presented to the Society, and in a

notice of the "Elements of Surgery" by John Syng Dorsey, published in 1813, he calls attention to a forgotten point in the history of ophthalmic surgery.

Dr. Dorsey describes Baron Wenzel's method of cataract extraction, in which no speculum was used and the capsule was opened by the point of the knife before completing the corneal section. Dr. Taylor points out that this operation has of late years been called "Trousseau's method," having been practiced by the brilliant Paris surgeon, A. Trousseau, who died in 1910.

The son of Baron Wenzel described the operation in his book "Traité de la Cataracte," published in 1786. Two instances are noted in which this error in ophthalmic history has been repeated by writers in the AMERICAN JOURNAL OF OPHTHALMOLOGY. (See vol. 2, p. 854 and vol. 3, p. 824.). We gladly make this correction. It is to such quiet students of history as Dr. Taylor that ophthalmic surgeons, writers and editors, must look for the correction of mistakes of this kind, which often thru the glamour of novelty, give revived popularity to procedures already long discarded.

E. J.

CORRESPONDENCE.

The St. Louis Meeting.

To Our Readers: The Section on Ophthalmology of the American Medical Association is the largest body of ophthalmologists in the world that holds annual meetings. This year it was surpassed by the Washington Internatinal Congress; and may be again, by the gathering of ophthalmologists and oto-laryngologists at Minneapolis in September. However, there were about 318 who registered at the St. Louis meeting of this Section, and the scientific interest and activity of its sessions were quite up to the standard of former years. The rule allowing members of the A. M. A. to register in only one section, divided the registration of those interested in both of them between this Section and that on Laryngology, Otology and Rhinology. But the plan of one section meeting in the morning and the other in the afternoon gave a free opportunity to attend both.

The place of meeting used by both of these sections was ideal. The Sheldon Memorial auditorium will seat 800 or 1,000, its acoustics are excellent, it can be easily darkened to show illustrations on the screen, and an admirable luncheon was served in the building, between the morning and afternoon meetings. This last feature largely removed the inconvenience otherwise arising from the long distance between the principal hotels and the part of the city in which the auditoriums for the sections were secured. Adequate provision for the meetings of the A. M. A. is not easily found in most cities. The total registration this year was 5174.

The installation of Dr. George E. de Schweinitz as President, and the delivery of his inaugural address, took place in the Odeon Theatre, before an audience which filled the building, while many could not get admission. His address, published in the JOURNAL of the A. M. A. for May 27th, disclaims any personal right to the honor conferred by his election, and speaks of it as recognition of the valuable work of the Ophthalmic Section, in which, however, he has for many years taken an active part. Dr. de Schweinitz and the outgoing President, Postmaster General Work, visited the various Sections together and briefly addressed them. This was a pleasant innovation in the meeting of the Association—a formal recognition of the vital part the Sections play in these meetings.

The relation of the Sections to the general plan of the A. M. A. was forced on the attention of the St. Louis meeting, by the proposal in the House of Delegates to do away with representation of the Sections in that body. No action of the kind was taken this year, but amendments were introduced to be acted on next year, and were apparently regarded with favor by the majority of delegates from two of the largest state medical societies. The proposi-

tion was reported to the Section on Ophthalmology at its first session, and after discussion was opposed by the overwhelming majority. Even the few who spoke in favor of such a change failed to raise their voices and vote for it when the vote came.

The Scientific Assembly, composed of the Sections, is the annual scientific meeting of the American Medical Association. The House of Delegates is the governing body. If the annual meeting is to be controlled by a body in which it has no representation, but which represents forty odd state societies, controlled by local interests, often far removed from those of the A. M. A. meeting, it is easy to see that the Sections will decline rapidly in interest and importance. As it is now, the Sections have only 15 representatives in a body of 150. That such a minority has any chance for safeguarding the interests of the Sections depends mainly on the superior standing and influence of the individuals chosen to represent the Sections.

At the business meeting of the Section on Friday morning, officers were chosen for the next year as follows: Chairman, John O. McReynolds, of Dallas, Texas; Vice Chairman, John Green, Jr., of St. Louis; Secretary, George S. Derby, of Boston; Member of the House of Delegates, Cassius D. Wescott, of Chicago. The Committee on Estimating Compensation for Eye Injuries submitted a majority report signed by Nelson Miles Black and Harry S. Gradle, and a minority report by Albert C. Snell. The latter took issue with the former chiefly in claiming that the total disability should be regarded as the *product* obtained by multiplying together the different factors; whereas the majority report regarded it as the *sum* of disabilities entailed by loss of visual acuity, binocular vision and visual field. The proposition to add to the number of the committee and continue it another year was voted down and the majority report adopted. Both reports appeared in the presession volume, and will doubtless be published in the transactions. The next meeting of the Association will be held in San Francisco, after an interval of eight years, since the last meeting on the Pacific Coast was held there in 1915.

E. J.

BIOGRAPHIC NOTICE.

T. H. Shastid, M.D.

Dr. George Alexander Fleming, professor of ophthalmology and oto-laryngology at the Women's Medical College, Baltimore, died suddenly on April 19, 1922. Dr. Fleming was born at Baltimore, March 4, 1860, son of the late Dr. John R. and Elizabeth R., Fleming. His medical degree was received at the University of Maryland Medical School in 1884. From 1885 to 1900 he practiced general medicine in Baltimore. From 1900 until his death he practiced in the same city ophthalmology and oto-laryngology.

He was for a time demonstrator of ophthalmology at the University of Maryland School of Medicine, Baltimore, surgeon at the Presbyterian Eye, Ear, and Throat Charity Hospital, and professor of ophthalmology and otology at the Women's Medical college. He was a Fellow of the American College of Surgeons.

Dr. Fleming, on Oct. 19, 1887, married Miss Bessie Shrives Keller. To the union were born three children—Margery, Catherine, and Elizabeth.

The Doctor was of medium height, smooth-faced, ruddy complexioned, and with blue eyes and auburn hair. He was brisk and gay in manner, ready of speech and good at repartee.

For several months Dr. Fleming had suffered from heart disease, yet his death, when it came, was unexpected. He is survived by his widow and daughters.

ABSTRACTS

Cheval, V. and Coppez, H. Lesions of Optic Nerve Due to Changes in Sphenoid and Parasphenoid. Royal Soc. of Med. and Nat. Sci. July 4, 1921.

There is a type of inflammation of the optic nerve to which the oculist assigns a sinus origin, and for which the rhinologist cannot always find the endonasal origin. This type is characterized by an enlargement of the blind spot (Van der Hoeve's symptoms) or paracentral scotoma. It is due to an axial inflammation in which the very delicate perimacular fibers of the optic nerve are the first to become involved. The cause is either an infection of the fibers of the optic nerve, or a strangulation of the nerve in its canal. The axial inflammation becomes strongly aggravated in a short time, resulting in loss of central vision.

The frequency of these cases, the great fragility of the optic nerve and the certain danger of blindness have lead Coppez to resort to posterior labyrinthectomy, as an early procedure to liberate the optic nerve. The result has justified this procedure, and the authors report a case of restoration to normal, following pansinuectomy performed only on the basis of a hyperemia of the papilla. The operative risk, so slight in such intervention, cannot be compared with the danger of certain blindness which threatens these patients.

M. D.

Hirsch, O. Eye Symptoms in Tumors of Hypophysis. Zeit f. Augenh. 1921, v. 45, p. 294.

Hirsch reports on the eye symptoms observed in his 59 patients with tumors of the hypophysis operated on by himself, in whom the operation verified the diagnosis. He discusses the topographic anatomic relations between the hypophysis and the visual paths; and rectifies erroneous conceptions, which are still found in text-books. The chiasma lies about 1 cm. above the chiasmal sulcus, not in it. The space between is occupied by the cisterna chiasmatis, and the hypophysis lies partly, sometimes entirely in front of, not behind, the chiasm. The lesions of the visual paths are not caused by the pressure of the tumor upon, or by stretching of the chiasm; but in the first place by constriction of the chiasm by the vessels of the arterial circle of Willis, within which the chiasm is not situated, and against which the chiasm is pressed by the growing tumors from below.

The tumors of the hypophysis without acromegaly chiefly create local pressure symptoms, viz., visual disturbances and enlargement of the sella. Those with acromegaly generally grow towards the frontal sinus and seldom toward the base of the brain, and consequently much more rarely produce visual disorders.

Central vision was impaired in 100%. Temporal hemianopsia was found in 77%. It is one of the most constant and important symptoms, and bitemporal hemianopsia is almost pathognomonic. Homonymous hemianopsia is due to lesions of the tract, showing that the tumor grew backwards towards the infundibulum. One sided nasal hemianopsia was observed in two cases, most likely as a precursor of homonymous hemianopsia, as only the noncrossed fibers of the optic tract were involved. If the compression reaches also the remaining portion of the tract, the homonymous hemianopsia becomes manifest. Central scotoma occurred in 11% of the cases at the inception, and led to the wrong diagnosis of retrobulbar neuritis and multiple sclerosis. Therefore Roentgen examinations in such cases are urgently recommended.

Primary atrophy of the optic nerve was observed in 89%, optic neuritis 0, postneuritic atrophy 4.4%, choked disc only 1%. According to Hirsch, optic neuritis and choked disc speak against the diagnosis of tumor of the hypophysis. The occurrence of primary atrophy is, perhaps, due to the constriction of the optic nerves by the tumor, creating a barrier against the entrance of cerebrospinal fluid into the optic sheaths. In general, large defects of the visual fields are associated

with corresponding ophthalmoscopic changes. White discs must not mislead to an absolutely bad prognosis, as Hirsch obtained by operation in such a case almost normal vision.

Tumors of the hypophysis with acromegaly produced in more than 50% no visual disturbances. But, if they occurred, they did not differ from those observed without acromegaly. Cases are reported in which the operation proved that the diagnosis was wrong, the supposed tumor being the extended third ventricle in hydrocephalus.

C. Z.

Rossi, V. Herpes Corneae with Bernard-Horner Syndrome. Arch. di. Ott. v. 27, 1920, p. 221-227.

The patient, a boy of seven, was an emotional child showing a fine tremor of the hands when excited, flushing of the face and slight blepharospasm. He was hypersensitive to adrenalin, that is, it produced a rapid mydriasis to 7.5 mm. in diameter. On the basis of such a constitution, the child developed influenzal pneumonia, in the course of which he showed ocular symptoms as follows:

The left eye showed a flushing of the skin of the lids, slight ptosis, bulbar congestion with punctiform opacities on the upper half of the cornea and decreased sensitivity of the cornea and myosis. The punctiform opacities developed into a typical herpes which covered the cornea. An ulcer developed, apparently by secondary infection, but healed very rapidly (three or four days). It was 80 days before the ocular condition cleared up. The ptosis persisted up to this time and enophthalmos developed, which completed the picture of a Bernard-Horner syndrome.

Cocain and atropin had little or no effect upon it, which seems to prove that it was a paralytic myosis and not simply due to ciliary spasm. Adrenalin produced an irregular oval dilatation (Melzer's reaction). The case is interesting, first because it is the first case of herpes corneae reported in influenza; second on account of its association with signs of the sympathicotonic type. Persons such as this, in whom the sympathetic system is hypersensitive, are especially susceptible to sympathetic instability from intoxications and infections. In this case, the bacterial toxins from influenza were probably responsible.

S. R. G.

Rossi. Vernal Catarrh and Constitutional Vagotonia. Arch. di. Ott. 1921, v. 28, p. 37-48 and 85-88.

This article forms an important contribution to the literature of vernal catarrh. The author studied nine typical cases, with thoro physical examinations, and concludes that there is a certain constitutional type in which vernal catarrh occurs. Tristaino had previously reported a large number of cases studied in the same way, and they showed disorders of the cardiovascular system, forming a syndrome considered by Angelucci as due to pathologic changes in the sympathetic system.

The author's cases showed similar cardiovascular changes and certain constitutional peculiarities, which he considers characteristic of the autonomotonic or vagotonic constitution. They showed flushing of the face, unstable emotions and tachycardia. Dilated hearts, gastrectasia and enteroptosis were often present. Adenoids, hyperidrosis, constipation and eczema were not uncommon. The skeletal changes observed were enlarged bones of the skull, face and epiphyses, which the author interprets as the result of overstimulation of the autonomic system, causing an increase in the calcium assimilation. The blood shows a marked increase in eosinophiles, which Eppinger and Hess proved to be a symptom of overstimulation of the vagus. These authors could even produce eosinophilia by artificial stimulation of the vagus, and the same blood change is found in socalled vagotonic diseases, such as asthma, urticaria, etc.

All of the author's nine cases showed a large number of these characteristics. The author interprets this syndrome differently from Tristaino. He believes it is due to hyperstimulation of

the vagus system, and this in turn is probably caused by a predominance of one or more of the glands of internal secretion. The thymus is suggested as possibly having an effect, but no attempt is made to determine which is the most important gland.

S. R. G.

Baldina, S. Iridochoroiditis of Endocrin Origin. Arch. di. Ottal, v. 28, 1921, p. 244-260.

The author reports the case of a man of 25, who was almost blind from progressive iridochoroiditis in both eyes. Three and a half years before, iritis developed in both eyes with especially severe premonitory symptoms of headache. At that time, one Wassermann was positive, but the disease resisted treatment by mercury and potassium iodid and when it finally subsided, he was left with vision of hand movements in both eyes. Optical iridectomy was performed on the right eye with little effect.

When first seen by the author, Wassermann was negative and the eyes were quiet. A bilateral symmetric patch of complete loss of pigment was noted on the skin at the inner angle of both upper and lower lids. The cilia were white in this region and very fine. The patient stated that this condition developed a year after the iritis. The existence of this patch of vitiligo indicates an involvement of the sympathetic system, supplied by certain branches of the first and second divisions of the fifth nerve. Similar cases of vitiligo from lesions of the sympathetic, and especially of the sympathetic components of the fifth nerve, have been reported. The reported cases of iridochoroiditis associated heterochromia iridis, alopecia areata and other diseases of a sympathetic origin, are reviewed in their bearing on the present case. Cases of uveitis associated with vitiligo have been reported by Erdmann, Komoto and Gilbert. There seems no doubt that in this case, the association was more than a chance occurrence. The author concludes that in cases of uveitis, where none of the usual causes are found, it is important to search for evidences of endocrino-sympathetic instability.

S. R. G.

Behr, C. Pathologic Concomitant Motions of the Pupil. Part I. The abduction phenomenon. Part II. The concomitant motion of the pupil, with some muscles supplied by the 3d nerve. Klin. M. f. Augenh, 1921, v. 67, p. 369.

In some cases of absolute, more rarely of reflex, immobility of the pupil, a concomitant movement of the pupil sphincters sets in with abduction. This is illustrated by the clinical histories of 6 cases. The contraction of the pupil as a rule occurs only in one eye, only if the impulse to abduction is abnormally strong, and then a little later than the beginning of this impulse. The pupil dilates at once after the cessation of the impulse. In all cases the lid closure reaction was abnormally marked. In 2 cases the phenomenon was observed in peripheral paralysis of the abducens, which excludes the explanation of Adamück by a peripheral anastomosis between the abducens and oculomotor nerve.

The contraction sets in only in horizontal abduction, not with looking upward or downward and outward. If the globe is fixed midway between primary and extreme sideward position by forceps, the phenomenon can be elicited by forced innervation. Hence a peripheral irritation of the posterior ciliary nerves by rolling of the eye suggests a central transfer of the abduction excitation to the path of the sphincter. Probably the abduction impulse, arising from the posterior center of fixation, jumps from the connecting path with the nucleus of the internus near the nucleus of the sphincter, to the physiologic path of the lid closure reaction (orbicularis sphincter nucleus) and is thus conducted to the nucleus of the sphincter.

The preservation of absolute immobility of the pupil renders it probable, that the lack of light and convergence reactions in such cases is due not to a focus in the nucleus of the sphincter or its centrifugal path, but is extranuclear, above the nucleus in the

afferent paths of the reactions to light and convergence, before this radiation into the nucleus of the sphincter. If under these conditions, the path of the lid closure reaction remain intact, this reaction may be preserved in spite of the lacking physiologically more powerful reactions to light and convergence. This extranuclear seat of the focus offers the possibility, that this abduction impulse, which is conducted to the homolateral nucleus of the internus thru the posterior longitudinal fascicle, jumps to the paths of the lid closure reflex.

Pathologic concomitant movements of the pupil with muscles supplied by the oculomotor nerve differ from the abduction phenomenon, and are to be explained differently. They occur in central and peripheral paralysis of the oculomotor nerve, the excitation interval is lacking and they do not require forced innervation. Generally a partial or complete paralysis of the exterior muscles exists, and in all cases a complete or incomplete absolute immobility, or more rarely a reflex immobility, or ophthalmoplegia interna. They can be explained by the anatomically supported assumption, that the regenerating nerve fibers land in wrong paths; and thus connect peripherally with heterogeneous elements, in this case with the path of the sphincter. Four cases are reported.

C. Z.

Brouwer, B. Visual Projection in Man. Netherlands Central Institute for Cerebral Investigation, Amsterdam. With illustrations.

Brower has examined the brain in two cases.

1. A case of double sided hemianopsia, with persistent but diminished central vision. A bilateral focus was found in the occipital lobes. Symptoms of mind blindness were absent; the visual memory and imagination were not damaged. On autopsy, in each hemisphere (occipital lobes), a focus was found which had damaged the calcarine region very little. On both sides; the posterior part of the occipital lobe was completely severed from the visual paths. In the cortex of the right hemisphere, the primary change was situated in the gyrus fusiformis, in the inferior gyrus occipitalis and in the occipital part of the inferior gyrus temporalis. In the left hemisphere, the original change of the cortex was situated more toward the lateral side, in the second and third occipital, in the occipital part of the middle temporal and in the fusiform gyrus. On the right only a part of the dorsal saggital strata was intact; while on the left side a smaller part in the ventral portion of these pathways was present. In both corpora geniculata externa important secondary degenerations existed, while a few smaller foci were scattered in the middle substance.

2. The second brain also came from an old woman. She had shown left hemianopsia. On autopsy, a focus was found in the medioventral portion of the right occipital lobe. This had destroyed the entire calcarine zone, with the exception of a small portion in the anterior part. The lobus lingualis and fusiformis were damaged primarily, and also the part of the inferior gyrus temporalis situated near the occiput. An important lesion of the visual pathway was found in the maximal cellular loss in the corpus geniculatum exterum. In the left hemisphere, a circumscribed focus in the dorsal part of the strata sagittalia was found, which was accompanied by a circumscribed loss of cells and fibers in the dorsal half of the corpus geniculatum externa.

Brouwer discusses the most important questions of the doctrine of the cerebral visual system. From his cases and a study of the literature he concludes, that the primary visual pathway goes only toward the medial side of the occipital brain, and does not reach the lateral surface of the occipital lobe. It is probable that a sharp anatomic pathway exists in the cerebral visual system of man; which must go parallel with a sharp physiologic tract, and therefore the fundamental theory of Henschen's doctrine must be considered correct. But it seems improbable that such a simple projection of the retina on the central nervous system is present, as this investigator has taught. Lenz's idea of an insular macula in the occipital lobe cannot be accepted. It is

a priori improbable that the localization of the central vision in the visual cortex should be in a small island. Study of the literature also demonstrates, that no case is known which forces such an acceptance. The macular region seems rather to be a large portion of the occipital cortex, which must be situated within the area striata.

E. E. B.

Lenz, G. Autopsies of Bilateral Color Hemianopsias. Zeit. f. d. g. Neur. u. Psychiat., 1921, v. 71, pp. 135-186.

The clinical histories of the cases were reported in 1912 to the Heidelberg Congress. The autopsy of the first case showed the following: Right very extensive, left smaller degeneration in the gyrus fusiformis. The right occipital apex was intact for about 2 cm., and then the degeneration extended over onto the gyrus lingualis. Further forward, in the most posterior section of the anterior quarter of the calcarine, a portion of the optical cortex was missing in the lowest section of the gyrus lingualis. Elsewhere, the optical cortex was normal.

But the medullary substance of the occipital lobe was very much altered. That of the gyrus fusiformis was completely destroyed, while that of the gyrus lingualis only in its lower part. In the most anterior part of the visual area was another focus connected with the upper part of the optic radiations. The latter were sprinkled with atrophic spots. On the left side, the lower part of the cortex of the gyrus lingualis, and the upper part of the gyrus fusiformis were destroyed. The optic cortex was normal everywhere. The central medullary substance was especially affected posteriorly; the lower part of that of the gyrus lingualis was destroyed. In addition to a defect in the lower inner part of the optic radiations, was an atrophic condition which was less pronounced than on the right side.

Microscopically, the finding were the usual ones of softening of the brain. The cortex near the foci showed a distinct atrophy of the lowest layer, the lamina fusiformis, and an atrophy of all layers in the region corresponding to the absolute scotoma of the fields. Thruout the entire cortex, especially in the external granular layer, there was a cellular infiltration. The external part of the upper pyramidal layer showed a rarefication.

The second case showed purulent meningitis, left purulent tonsillitis, luetic aortitis, parenchymatous degeneration and beginning contraction of the kidneys. The external appearance of the brain was normal. Numerous foci of degeneration in the white matter, especially anteriorly, which affected both optic radiations, the lower part of the left more than the upper. Microscopically, there were numerous foci of degeneration, especially in the outer surface of the occipital cortex, and in places small cysts. Very small foci in the region of the calcarine cortex, without involvment of the white matter. Cellular infiltration of the cortex as in the first case.

The author discusses the relation of the findings to the clinical symptoms. He denies the existence of a special color center, and regards the loss of color vision as due to a relative disturbance of the optic conduction.

C. L.

Angelucci, Light and Sentiment. Arch. di. Ott. August, 1920, vol. 27, p. 21.

In quite a long article, the author traces the appearance of the symbolic use of different colors in patriotic literature and art, and attempts to show the far reaching effects of the different forms of light in the psychology of the races. As an instance of this, countries with a clear sunny climate produced an art in which an emphasis of form was noticeable; whereas in countries with a misty climate, there was a lack of this emphasis of form, and colors became prominent, as in the Venetian and Flemish schools. He describes the experiments which prove heliotropism of the retinal epithelium in the lower animals. This greater response for blue, less for yellow and least of all for red is found as the animal scale is ascended. S. R. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. George Alexander Fleming, of Baltimore, Maryland, age fifty-nine, died April 18th, from heart disease.

Dr. Chas. W. Tangeman, of Cincinnati, age sixty-five, died April 2nd.

PERSONALS.

Dr. F. A. Plum, formerly of Honolulu, has gone to Seattle, Washington, to locate.

Dr. J. Gray Clegg, F.R.C.S., has been appointed university lecturer in ophthalmology, Manchester, England.

Dr. H. Alexander Brown has returned to his home in San Francisco after a delightful trip thru the Orient.

Dr. H. R. Lesser has changed his address from 294 Central Park West, New York City, to 1708 Jefferson Avenue, Toledo, Ohio.

Dr. John C. Dye, formerly of Statesville, North Carolina, now has charge of the Eye Department, Tripler General Hospital, Honolulu, T. H.

Dr. Joseph A. Mullen, of Houston, Texas, has been reelected president of the Houston Ophthalmological and Oto-Laryngological Society.

Dr. Harry Vanderbilt Würdemann, Major Medical Officers' Reserve Corps, of Seattle, Washington, was ordered into active army service in connection with the Citizens' Military Training Camp, for fifteen days.

Dr. L. Webster Fox, of Philadelphia, sails for England, July 8th, to read a paper before the Ophthalmic Section of the British Medical Association, holding their annual meeting in Glasgow.

Dr. Guilford M. Duckworth, of Cuero, Texas, was given the degree of Doctor of Ophthalmology at the Commencement of the University of Colorado, June 12, 1922. The subject of his thesis was "Observations on Toxemic Ophthalmia."

Prof. Ernst Fuchs addressed a joint meeting of the Colorado Ophthalmological Society and the Denver County Medical Society upon "The Relations Between Tabes and the Eye." In the evening he was entertained at dinner with about thirty of the ophthalmologists in attendance, June 13th.

Dr. Casey Wood is now in England. He will, by appointment, act as American representative at the Third International Congress of the History of Medicine, to be held in London, July 17-22, 1922. The General Secretary of the Congress is Dr. J. D. Rolleston, 21 Alexandria Mansions, Kings Road, London, S. W. 3.

Professor Barraquer performed most skilfully a series of cataract extractions, during his Philadelphia visit, at Wills, Jefferson and Polyclinic Hospitals. At the same institutions Colonel R. H. Elliot, of London, performed with his brilliant technic a series of corneal trephine operations for glaucoma.

On the evening of May 8th, a dinner was given by twenty-five ophthalmologists, at the University Club, Chicago, in honor of Prof. Fuchs and Prof. Gallemaerts of the University of Brussels. Prof. Fuchs was giving a course of lectures in Chicago. Prof. Gallemaerts came as a delegate from Belgium to the International Congress of Ophthalmology in Washington, and was making a tour of most of the larger cities of this country before returning to his home.

Sir Arthur Pearson, the blind philanthropist, whose recent death has been mourned by the whole of England, is the subject of an interesting article in *The Cornhill Magazine* for February. Pearson, who was afflicted with blindness in the midst of a successful career, devoted the rest of his life to helping the blind less fortunate than himself.

Dr. Thomas A. Woodruff has resumed the practice of ophthalmology in New London, Connecticut, with offices in the Plant Building. Dr. Woodruff gave up practice in January, 1921, in order to take over the management of the Lincoln Paper Mills Company at St. Catharines, Ontario, Canada. He resigned from this position the first of the year, and for the last three months has been traveling in the Mediterranean region.

Professor Fuchs, of Vienna, gave a series of twenty lectures in Philadelphia, during the month of March, upon Ocular Pathology, under the auspices of the Ophthalmic Section of the College of Physicians, at the College Building, Twenty-second Street above Chestnut. The arrangements were in charge of the Executive Committee of the Section, consisting of Dr. de Schweinitz, Dr. Hansell, and Dr. Ring. Professor Fuchs was extensively entertained during his stay in Philadelphia, and made a profound impression upon the large group of ophthalmologists of Philadel-

phia and vicinity, who gave themselves the rare privilege of hearing him.

SOCIETIES.

The Colorado Congress of Ophthalmology and Oto-Laryngology, will be held in Denver, Colorado, on July 28 and 29, 1922.

The American Homeopathic Ophthalmological, Otological, and Laryngological Society is to hold its annual convention in Chicago in June. The sessions are to be held in the Drake Hotel.

The name of the Portland Ophthalmological and Oto-Laryngological Society has been changed to the Oregon Academy of Ophthalmology and Oto-Laryngology. Officers elected for the coming year are: President, Dr. C. Gertrude French, The Dalles; and secretary-treasurer, Dr. Andrew J. Browning, Portland.

A meeting of the Medical Society of the State of California was held at Yosemite National Park, May 15-16-17-18. Dr. Frank A. Burton, of San Diego, was chairman, and Dr. Harvard McNaught, of San Francisco, secretary of the eye, ear, nose and throat section. A very interesting and profitable program was carried out.

The tenth annual meeting of the Nebraska Academy of Ophthalmology and Oto-Laryngology was held at the University Club, Omaha, April 24, 1922. Papers were read in the afternoon by Doctors I. W. Haughey, Aurora; H. F. Morrison, Lincoln; C. G. Baird, Beatrice; C. T. Uren, Omaha; A. G. Leuschen, Columbus. Following a dinner in the evening, Dr. Albert H. Andrews, Chicago, read a paper on "Lateral Sinus Complications of Acute Otitis Media." The new officers for 1922 are: President, Dr. L. B. Bushman, Omaha; vice-president, Dr. Harold Gifford, Omaha; secretary-treasurer, Dr. Clarence Rubendall, Omaha.

At a called meeting held May 9, 1922, at the Library Building, in Brooklyn, N. Y., of the Medical Society of The County of Kings was organized The Brooklyn Ophthalmological Society. The officers elected were: President, Dr. Joseph E. Golding; vice-president, Dr. Ralph I. Lloyd; secretary-treasurer, Dr. Willis M. Gardner. Dr. James W. Ingals and Dr. Henry M. Smith were elected to form with the officers an executive committee. Membership is limited to oculists resident on Long Island. Dues five dollars per year. Meetings bimonthly—October, December, February and April. An annual meeting and dinner was held in May, at which occurred election of officers. Those present were: Joseph M. Bruno, John N. Bailey, Joseph L. Behan, James A. Bilello, Louis L. Cohen, Nathan Cohen, George E. Deeley, Alfred A. de Yoanna, John N. Evans, George Freiman, Willis Morton Gardner, Joseph E. Golding, Samuel W. Green, Charles A. Hargitt, Edwin E. Higgins, James W. Ingals, Philip Katzan, Isaac D. Kruskal, Mary L. Lines, Ralph I. Lloyd, Frank E. Mallon, John H. Ohly, E. Clifford Place, Robert M. Rogers, William G. Reynolds, Herbert D. Schenck, Henry Mitchel Smith, William F. C. Steinbugler, Henry W. Waugh, Ethel M. Dobinsky-Zatz.

The Philadelphia Hospitality Committee of the International Congress arranged a dinner of fifty-one covers on the evening of Thursday, May 4th, at the Rittenhouse Club, in honor of Mr. Treacher Collins, of London, official representative of the English government and of the Royal College of Surgeons of England, Professor Mackay, of Edinburgh, representing the Royal College of Surgeons of Scotland, Professor Magitot, of Paris, and Dr. Gutierrez, of Cuba. Appropriate responses were made by the guests of honor and by Justice W. I. Schaffer of the Supreme Court of Pennsylvania, and by Dr. de Schweinitz and Dr. Ring.

The Philadelphia Hospitality Committee of the International Congress of Ophthalmology arranged a dinner of fifty covers, at the Rittenhouse Club, on Wednesday evening, April 19th, in honor of Colonel R. H. Elliot, of London; Dr. J. G. Clegg, of Manchester, England; Professor G. S. Rochat, official representative of the Netherlands and Professor of Ophthalomology in the University of Groningen, Holland; Professor Emile Gallemaerts, of the University of Brussels; Professor Allvar Gullstrand, of the University of Upsala, Sweden; Dr. Nordensen, of Stockholm, Sweden; Professor Barraquer, of Barcelona; Dr. Poyales, representative of the Spanish government; and Dr. J. O. McReynolds, of Dallas, Texas. The members of the committee, of which Dr. G. Oram Ring was chairman, included Dr. Howard F. Hansell, Dr. S. Lewis Ziegler, Dr. Wm. Campbell Posey. Dr. W. M. Sweet, Dr. Luther C. Peter, Dr. Thomas B. Holloway, Dr. McCluney Radcliffe, and Dr. Charles R. Heed. All of the guests of honor made appreciative responses. Dr. de Schweinitz represented America in his welcome, and Dr. Ring acted as toastmaster.

MISCELLANEOUS.

The New York Association for the Blind will receive a bequest of $5,000 thru the will of Mrs. Susie D. Smith.

Courses for home teachers of the blind and teachers of conservation of vision classes will be given at the Columbia University summer school session, July 10th to August 18th, under the supervision of Robert B. Erwin, of Cleveland.

Prof. G. Cirincione, of the chair of eye disease at the University of Rome, and a local merchant have presented the authorities with 240,000 liras to found national and international scholarships in ophthalmology.

The German Ophthalmological Society met at Jena in June. In addition to the usual business, the bestowal of the Graefe Medal was to be made. This medal is awarded once in ten years to the ophthalmologist, irrespective of country, who is regarded by members of the society as the greatest scientific benefactor to ophthalmologists. The previous recipients of the medal have been H. von Helmholtz, Theodor Leber, and E. Hering.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Cohen, M. Significance of pathologic changes in fundus. (8 ill. dis.) J. A. M. A., 1922, v. 78, pp. 1694-1701.

Dimmer, F. Difficulties in diagnosis of eye diseases. Wien. med. Woch., 1922, v. 72, p. 558.

Gallemaerts, E., and Kleefeld, G. Microscopic study of fundus of living eye. (4 ill.) Ann. d'Ocul., 1922, v. 159, pp. 264-274.

Gradle, H. S. Gullstrand slit lamp. (8 ill.) Arch. of Ophth., 1922, v. 51, pp. 264-272.

Wurtz, J. G. Value of laboratory in diseases of eye, ear, nose and throat. Jour. Ophth., Otol. and Laryng., May, 1922, pp. 169-180.

THERAPEUTICS.

Lambert, C. A. Metallic cataphoresis in eye, ear, nose and throat work. Eye, Ear, Nose and Throat Monthly, 1922, v. 1, p. 163.

Montier, F., and Guerin, A. Bulbar syndrome with acute intoxication after injections (intraorbital) of cocain. Presse Méd., April 19, 1922, p. 335.

OPERATIONS.

Elschnig, A. Cocain-alcohol injections into sphenopalatine ganglion. Klin. M. f. Augenh., 1922, v. 68, pp. 295-300.

PHYSIOLOGIC OPTICS.

Cantonnet. Examination of depth perception at a distance. (dis.) Ann. d'Ocul., 1922, v. 159, p. 320.

Deyo, B. V. Monocular and binocular judgment of distance. (2 tables, 1 graph. bibl.) A. J. O., 1922, v. 5, p. 343.

Erfle, H. Magnification, lens magnification and telescope magnification. Naturwiss., 1921, v. 9, pp. 1033-1037.

Frey, M. v. Socalled perception of empty space. Zeit. f. Biol., 1921, v. 73, pp. 263-266.

Jackson, F. D. How to use ophthalmometric findings. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 210-214.

Joly, J. Quantum theory of vision. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 130-149.

Roelofs, C. O., and Bierens de Haan, L. Influence of illumination and contrast on visual acuity. (12 ill.) Graefe's Arch. f. Ophth., 1922, v. 107, pp. 151-189.

Schanz, F. Effects of light and ultraviolet radiations. (2 ill.) Graefe's Arch. f. Ophth., 1922, v. 107, pp. 190-195.

Tefft, L. E., and Stark, E. K. Speed of accommodation as practicable test for fliers. (5 tables.) A. J. O., 1922, v. 5, pp. 339-342.

Repeated titles. **Baldino, S.** (O. L., 1921, v. 17, p. 540). A. J. O., 1922, v. 5, p. 408.

REFRACTION AND ACCOMMODATION.

Dufour, M. Precision in skiascopic methods. (1 ill.) Ann. d'Ocul., 1922, v. 159, pp. 285-298.

Gleichen, A. Comparison of largon with punktal lenses. Zent.-Zeit. f. Opt. u. Mech., 1921, v. 42, pp. 536-538.

Hegner, C. A. Action of lenses in spectacles. Schweiz. med. Woch., 1922, v. 52, p. 302.

Hinrichs, W. Largon lenses. Zent.-Zeit. f. Opt. u. Mech., 1921, v. 42, pp. 538-541.

Hoffman, J. H. Essentials in diagnosis of headache due to eyestrain. Eye, Ear, Nose and Throat Monthly, 1922, v. 1, pp. 156-157.

Kirsche. Active skiascopy method. Deut. opt. Woch., 1921, v. 7, pp. 974-975.

McMillan, L. Association of failure of accommodation with sore throat. Lancet, May 27, 1922, p. 1048.

Murphy, F. G. Eye glasses versus spectacles. A. J. O., 1922, v. 5, pp. 360-361.

Pinkham, C. I. Chromatic aberration in eye and lenses. Arch. of Optometry, 1922, v. 1, pp. 84-86.

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Ryer, E. L. Applied dynamic retinoscopy. Arch. of Optometry, 1922, v. 1, pp. 98-102.

Sheard, C. Comparative value of various methods and practices in skiametry. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 177-208.

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OCULAR MOVEMENTS.

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Buckley, J. H. Catgut suture in muscle tucking. Eye, Ear, Nose and Throat Monthly, 1922, v. 1, p. 164.

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Marin Amat. Hysteric strabismus. (dis.) España Oft., 1922, v. 7, pp. 51-53.

Marlow, F. W. Persistent accommodative spasm due to latent hyperphoria. (1 ill.) Arch. of Ophth., 1922, v. 51, pp. 223-226.

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HERNIA THRU TENON'S CAPSULE WITH EXTRUSION OF ORBITAL FAT A BIRTH INJURY.

WALTER SCOTT FRANKLIN, M.D., F.A.C.S. and WARREN D. HORNER, B.S., M.D.

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This is the report of a case of deformity of the lids apparently due to birth injury. The condition produced appears not to have been previously described. It was remedied by an appropriate operation. Contributed from the department of Ophthalmology of the University of California.

Birth injuries of the ocular structures are not infrequent, and may range in severity from a transient edema to actual evulsion of the globe or serious intraocular damage. The case here presented, while mainly cosmetic, is of unusual interest because of its rarity, and because it was correctly diagnosed before operation.

CASE HISTORY: A. W., male, aged 5 1/2 years, was referred by Lieut. O. R. Goss, Medical Corps, U. S. Navy, January 9, 1922. Complaint: Swelling of both lids.

Family History: Child is an only son. The parents are living. The father, a naval officer, was recently injured thru accident on shipboard. Was previously in good health. The mother is well. There is no history of miscarriage. There are no familial diseases. The child had instrumental delivery and the skull was fractured at birth. Further details of birth are not available.

Past diseases include pertussis, aet. 9 months. A valvular heart lesion was diagnosed, aet. 3 years. The child has been well for the most part, but never robust. His color has always been pale and a certain puffiness beneath the eyes has caused repeated heart and kidney investigations. Tonsils and adenoids have been removed.

The eye history dates from birth. The mother states that during instrumental delivery, the child suffered a fractured skull and was not expected to live. The eyes could not be seen for three months on account of swelling. Following this, the edema slowly receded. There has been no apparent change in the eyes during the past three years.

The mother comes for an opinion on the subconjunctival swellings. She states that she has had the patient examined several times before with varying recommendations. The child's vision has always seemed normal. R. 0.4, L. 0.6, illiterate.

Right eye: There is considerable puffiness beneath the eye. A mass depresses the contour of the upper lid giving the effect of a partial ptosis. This tumor is a regular swelling appearing beneath the ocular conjunctiva nasally and above, near the upper fornix. It has the color of conjunctiva with a translucent yellow tinge. It does not pulsate and is freely movable beneath the conjunctiva. There is no injection or induration. The conjunctiva itself is pale. A vertical fold of conjunctiva covers the edge of the cornea when the patient looks to the left. The orbital rim is not involved.

The *left eye* shows an analogous condition. A soft kidney shaped mass lies beneath the ocular conjunctiva near the inner canthus. It curves from approximately 2 mm. above the canthus downward and outward almost to the limbus. It is mobile, regular, and has a pale yellow color. The ocular

movements are normal. Both fundi are normal.

The *general physical examination* proved to be negative with two exceptions. The skull showed a depression along the coronal suture, probably secondary to the forceps injury. A previous X-ray of the skull was said to have been negative. There was a systolic cardiac murmur. Wassermann's test was not done. The urine was negative.

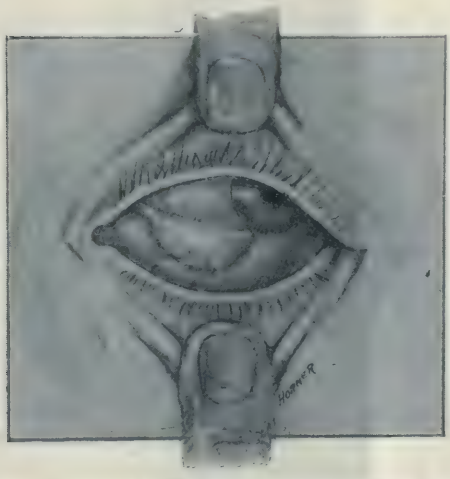

Fig. 1. Left eye showing subconjunctival tumor mass.

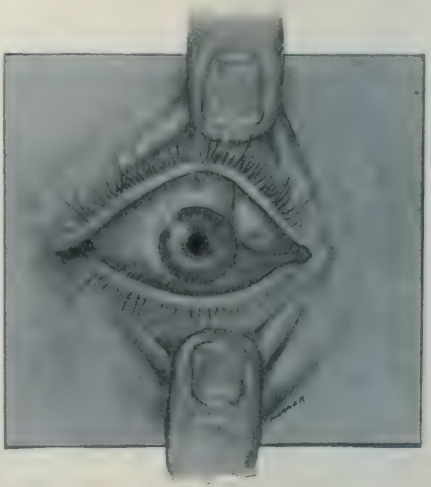

Fig. 2 Right eye showing subconjunctival tumor mass.

The eye condition was diagnosed as a rupture of Tenon's capsule with extrusion of orbital fat.

Operation was advised to excise or replace the fatty masses. Operation was performed at Children's Hospital under general anesthesia.

The left eye was operated upon first. The conjunctiva at the lower inner quadrant, overlying the tumor, was split with scissors and retracted by stay sutures and retractor. This exposed the tumor mass which had the appearance of orbital fat. Blunt dissection disclosed a smoothly lined tube in which the fat lay admixed with a certain amount of rather vascular fibrous tissue, the whole extending into the depths of the orbit. Traction on the mass was transmitted deep within the orbit and considerable retraction occurred when the tension was removed. There was no apparent connection with the internal rectus and this muscle was not exposed. The herniated mass was clamped, ligated and resected. The stump immediately retracted into the orbit. The tube-like rent in Tenon's capsule, i. e., hernia sac, was sutured with a mattress stitch of No. 1 catgut. A conjunctival suture of black silk closed the wound.

Right eye: Incision was made thru the conjunctiva at the superior nasal aspect over the tumor. The fat was loosened by blunt dissection from the hernia sac and abscised. Tissue accompanying the sac (externally) was left in situ. The gap in Tenon's capsule was closed by interrupted sutures of fine catgut. The conjunctiva was closed with black silk, and the usual yellow oxid salve dressing applied.

Both eyes were bandaged for four days, when the stitches were removed. There was but slight postoperative swelling and healing was uneventful. The operative result proved excellent. The masses were entirely removed and the conjunctiva healed smoothly. Eye movements were free in all directions.

The tumor masses removed measured 8x10 mm. for the right eye, and two pieces each 10x10 mm. for the left. Dr. G. Y. Rusk, Pathologist to the University of California Hospital, gave the following report:

"Microscopic examination of numerous sections shows tissue composed of fat, thru which run bands of fibrous tissue apparently more marked than would normally be present. No muscular tissue was observed, and no inflammatory reaction. Diagnosis—fat with fibrosis."

A representative section is shown by microphotograph.

We determined to investigate the formation of the hernia. In the cadaver it was found that a probe could be readily passed from the back of the orbit to lie beneath the conjunctiva, especially in the spaces between muscles. The capsule of Tenon is thin, especially anteriorly, where it fuses with the conjunctiva. Pressure on the orbit from a forcep blade might easily exert sufficient pressure to rupture this capsule and produce a subconjunctival fat hernia. Moreover, a blade could lie over each eye causing a bilateral injury as resulted in this case. That the traumatism was severe is evident from the amount of periocular swelling that occurred after birth. It is unfortunate that we are not able to get the obstetrician's notes on the case.

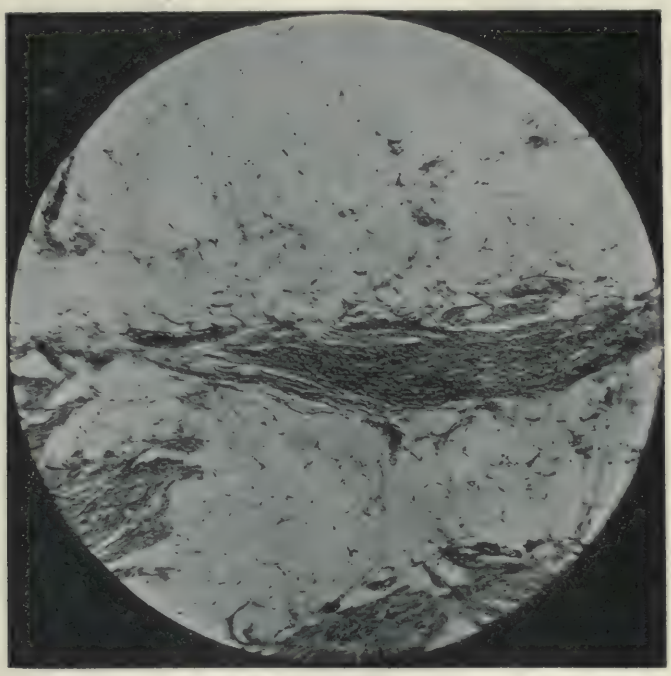

Fig. 3. Photomicrograph showing fatty structure of tumor mass.

A careful survey of the literature has not shown a similar case.

LYMPHOSARCOMA OF THE ORBIT PROBABLY ARISING IN THE CHOROID.

ISAAC HARTSHORNE, M.D., F.A.C.S.

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This is the report of a case presented at the Eye Section of the New York Academy of Medicine, November 21, 1921, with the report of the pathologic findings by Leila Charlton Knox, M.D. The case terminated fatally six weeks after it was presented.

John R., now 3 years old, the first child of healthy parents, was brought to me May 9, 1919, at six months of age, with an acute conjunctivitis, with much chemosis in the left eye. Duration, four days. The cornea was clear, the discharge watery, and the iris apparently normal. Culture later reported negative. Ordered:—Cold fomentations, argyrol 25% every two hours, and atropin 1/2% twice a day. There was no previous history of exanthemata or any other illness.

May 12, 1919: Conjunctivitis improved; pupil moderately dilated and no iritic tags present; iris appeared muddy and fibers thickened; cornea steamy, but without deposits on Descemet's membrane: Practically no circumcorneal injection. Tension normal with fingers. Ophthalmoscopic examination:—No red reflex, and fundus details obscured. Oblique illumination showed a yellowish reflex from the whole fundus. No abnormality seen in right fundus. The same treatment was continued. Wassermann negative, and otherwise a perfectly normal child.

May 20, 1919: Consultation at the Manhattan Eye and Ear Hospital with Dr. Charles W. Kinney: Diagnosis, pseudoglioma (?). Advised enucleation, which was refused.

During the next three months, the eye went thru a typical interstitial keratitis, which was treated with atropin, and mercury and potassium iodid, on general principles.

Sept. 10, 1919: No inflammation present; cornea opaque and phthisis bulbi setting in.

Believing that a tumor of some kind was present at the posterior pole of the globe, and as the eye could not possibly improve, enucleation was strongly urged and again refused. He then passed out of my hands and did not return to me until May, 1921. During this time he was under the observation of an ophthalmologist in New York City who, I am told, felt the advisability of keeping the globe in place as long as possible, for the sake of development of the orbit. I only regret that he did not get in touch with Dr. Kinney or me, as the original picture might have changed his opinion. At some time during this period Dr. Arnold Knapp saw the patient and advised immediate enucleation.

In May, 1921, he was brought back to me with the contents of the left orbit bulging so that the upper lid just barely closed over the mass. The details of the eye were indistinguishable in a smooth faintly brownish mass, with a yellowish area about one-quarter inch in diameter in the lower cul de sac at the external canthus. This mass was not movable with rotation of the other eye, and resisted palpation, as if filling the whole orbit. It was explained to the family that it was probably too late, but that immediate operation was imperative. Right eye was not examined at this time.

On May 23, 1921, at St. Luke's Hospital, with the assistance of Dr. Alfred Wiener, I exenterated the left orbit to the periosteum, to a point back of the tumor mass and almost to the apex of the orbit. During an uneventful recovery, on June 10th, Dr. Wm. B. Long, gave the orbit one exposure to radium.

On July 11, 1921, in the hope of getting a socket for an artificial eye, I made, with Dr. Wiener's assistance, a pedunculated graft from the brow to the lower cul de sac. The graft "took," and after healing held a shell for three weeks. An artificial eye was then fitted and used for about five weeks until early in September, when it could

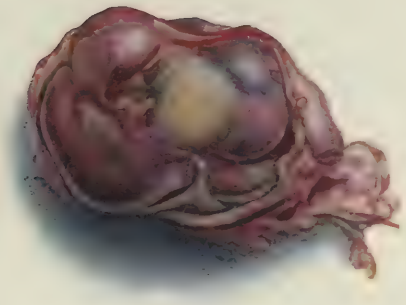

FIG. 1. GROSS SPECIMEN SHOWING EYE, TUMOR AND ORBITAL CONTENTS

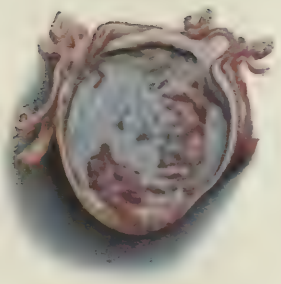

FIG. 2. HORIZONTAL SECTION OF EYE WITH INTRA- AND EXTRAOCULAR PORTIONS OF TUMOR. INVASION OF THE SCLERA IS SEEN ON THE RIGHT

no longer be inserted, and it became evident that something more than granulation tissue was present.

Dr. John M. Wheeler kindly saw the case with me, and felt that no further plastic operating could be done. Since September 18, 1921, Dr. Long has given fortnightly X-ray exposures over the left orbit; and, since October 15th, also over the right. The X-ray has been given on alternate weeks,—one week over the left, and the next week over the right orbit. In spite of the X-ray treatment, the mass is growing steadily, so that the left socket is closed by the growth from the orbit, which has spread into the surrounding bony walls and bulges over the temple and frontal region, and extends to the internal canthus of the right orbit.

The findings in the right eye, which have been present several months, are interesting, tho not entirely explainable. Externally:—the eye appears normal, and the pupil is active to light and accommodation; media, clear. Fundus:—nerve appears normal; vessels not remarkable. In the superior temporal region there is an extensive area of atrophy of the choroid, without elevated patches or exudate. A few smaller patches of choroidal atrophy are present to the nasal side of the fundus. Dr. Colman W. Cutler thinks these areas of choroidal atrophy may be due to some pressure or irritation effecting a trophic disturbance of this region. To the nasal side, near the superior nasal vein, there is a circumscribed elevated area which can be seen with a plus 12 lens, which is about the size of the disc, dark in color, and without vessels passing over it. Probably this is a mass behind the choroid, of metastatic origin, and, I think it is increasing in size.

On palpation of the right eye there is slight tenderness and slight resistance as of pressure from behind the globe.

The boy is becoming progressively more pale and peevish, and complains of pains in the arms and legs. While this case represents a failure, from lack of cooperation on the part of the family, there is much about it that is instructive.

The patient died January 15, 1922, in a convulsion. Autopsy refused.

REPORT ON PATHOLOGY.

LEILA CHARLTON KNOX, M.D.

Macroscopic Examination: The specimen consists of left eye and orbital contents. (See Fig. 1.) It measures 3.5 x2.7x2.5 cm., exclusive of a small amount of fascia, muscle, and the lacrimal gland. Traces of the conjunctiva surround the globe and tumor. The main mass is a solid nodular tumor which projects forward from the inner canthus, pushing the eyeball downward and outward. The nasal portion of the sclera appears as a smooth, opaque, yellowish membrane, and at the side of it a small area of the cornea is barely recognizable, being also opaque and injected. The posterior portion of the sclera, about 1.5 cm. on each side of the stump of the optic nerve, appears relatively normal, but elsewhere it is noticeably thinned. No gross involvement of the nerve by the tumor is seen.

A horizontal section of the eyeball shows that no other normal structures are present, and that the sclera is also much thinned anteriorly, where the tumor mass is most closely adherent. The lens, iris, ciliary body, and retina cannot be identified, but pigmented fragments of choroid are scattered thruout the posterior portion of the tumor (See Fig. 2).

The bulb is completely filled with a soft cellular neoplasm, greyish in color, except for scattered foci which are yellowish, granular, and appear necrotic. The extraocular mass has a maximum thickness of 1 cm., is more homogeneous, and does not show degeneration.

Microscopic Examination: Sections of the globe show that it has been completely filled with the tumor, destroying almost all normal structures. Detached choroidal cells may be seen embedded in the growth. The sclera is widely invaded. The tumor is composed exclusively of rather small round or oval cells, in which cytoplasm can only infrequently be made out. (See Fig. 3.) Stained with hematoxy-

lin and eosin, they very closely resemble lymphocytes, but are often slightly larger and more irregular in form. Mitoses are frequent. The stroma is extremely scant, and certain areas within the globe are calcified, tho not ossified. The tumor outside of the eyeball is better preserved, more vascular, has a more delicate and cellular stroma, but is not calcified. The limiting capsule is very thin, but no infiltration of the orbital fat could be demonstrated. Nodular collections of lymphocytes are found thruout the stroma of the lacrimal gland, but whether or not they are neoplastic it is impossible to state, so closely do many of the tumor cells resemble those of inflammatory exudates.

In studying a tumor in this location, neuroglia is of course to be excluded as a source, but unfortunately Unna's pyronin-methyl green stain for the fibrils could not be carried out, due to their inadequate fixation while the drawings of the gross specimen were being made. The Bielschowsky stain, however, does not show such fibrils, as the more delicate portions of the reticulum are clearly prolongations of the stroma cells, and not a part of the cells of the tumor. The general arrangement of the cells is, however, quite unlike that described by Ribbert as typical of many intraocular gliomata, namely the striking perivascular distribution of the cells with a thick mantel around the capillaries, but the rest of the structure mainly necrotic. Also the cells do not form rosettes as neuroepithelium characteristically does in tumors. Were either of these formations present, the diagnosis of glioma could readily be made, irrespective of the other morphologic details which occur less frequently in tumors of neural origin.

If the size and arrangement of the cells in this tumor are compared with those of other lymphosarcomata occurring in children, it will be seen that there is little morphologic difference. For example, Fig. 3 (below) shows a portion of such a tumor of the mediastinum, which caused the death of a child, ten years of age, by pressure on the trachea.

The cells are very similar to those of the orbital one in size and form, and in both tumors they are diffusely scattered with no characteristic arrangement. The stroma is negligible in each. The apparent difference in cellularity is explained by the variation in thickness of the sections.

LITERATURE.

Lymphoid tumors arising within the eyeball are not described, and the possibility of an origin close to the sclera in the orbital tissue and an early penetration of the coats must be considered. However, lymphoid tissues composed of germinal follicles, round cells and sinuses do not exist normally in the orbit either; but the lymph vessels of the ciliary body are an important part of its mechanism, and it is conceivable that a deposit of lymphocytes might occur there as an abnormal or pathologic structure. The literature contains references to a number of cases of both benign and malignant lymphomata of the orbit and lids, the former frequently bilateral and the latter very rarely so.

Rückel described such a case, the tumors occurring symmetrically in both lower lids of a girl seventeen years of age. The tumors had first been noted at the age of four, and growth had been slow and progressive for thirteen years. The masses were enucleated and found to be lymphomata with normal follicles, tho also with some cyst formation.

Seven other cases of this type are cited, as well as thirteen of the symmetric pseudoleukemic variety. Some of the latter are probably due to systemic infections, and hence belong probably to the Hodgkins' group, while on the other hand, some have pursued a malignant course, thus casting some doubt on the etiology of the group.

Other bilateral tumors are those of true leukemic nature, but these are no more frequent in the orbit than elsewhere, and are not necessarily related to the other lymphomata.

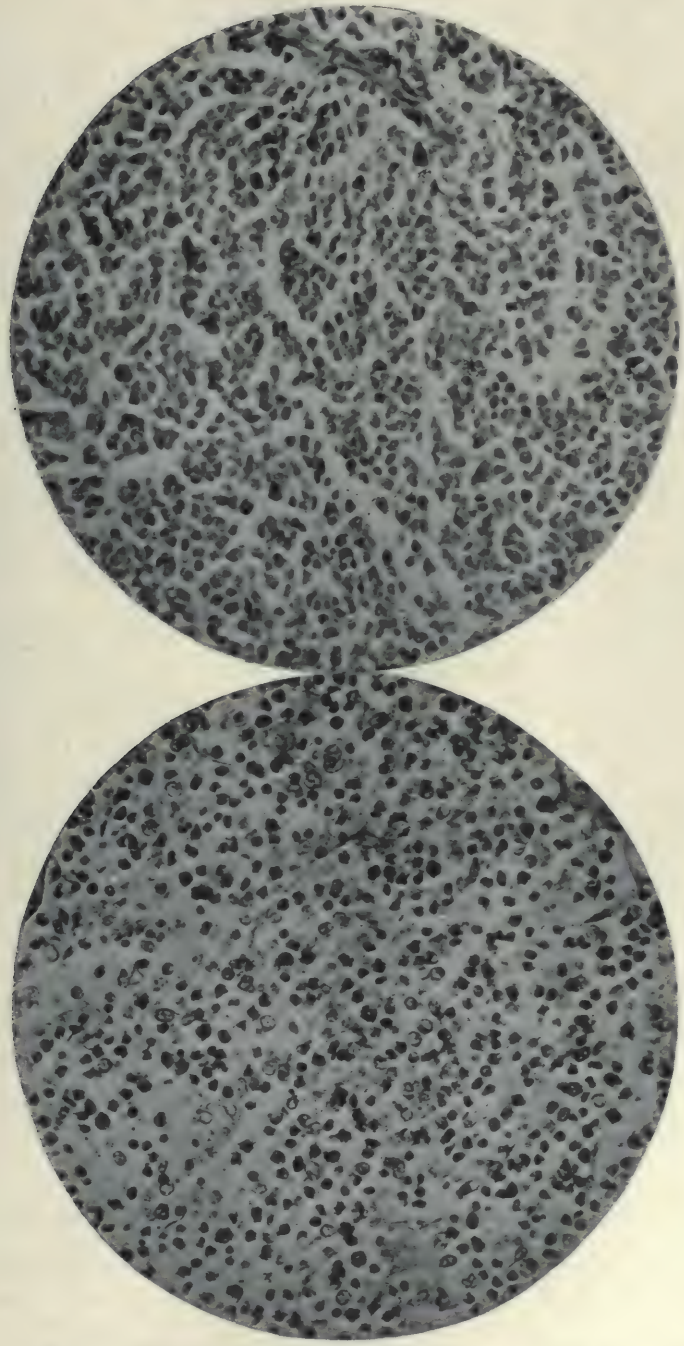

Fig. 3. Photomicrograph of lymphosarcoma of eye (above) and of lymphosarcoma of mediastinum (below). Comparison of these both magnified x 577 shows the similarity of morphology.

Unilateral lymphomata are also described, tho they are rarer than the bilateral ones. Early cases were reported by Chauvel, Coppez, and Varatges, and more recently by Würdemann, Oliver, and Fleischer and Scherer. Oliver removed a retrobulbar tumor from the orbit of a man of 57 years, who gave a history of diplopia since the age of 30. A visible mass had been present above the eye for three months. Prolongations of the growth extended back into the apex of the orbit. Examination showed that the tumor was a lymphosarcoma, but unfortunately the late clinical result is not given.

Fleischer and Scherer were able to find reports in the literature of only two cases which they considered unquestionably lymphosarcoma of the orbit, that of Oliver cited above, and another by de Vincentiis cited in Axenfeld-Fick's Pathologie des Auges. The patient seen by these writers was a soldier forty years of age, discharged from the late war in December, 1918, after four years of service. At this time a slight inflammation of the left eye was present. This became worse until February, 1919, when the tumor became evident. This was removed thru an incision in the upper lid, and found to be attached to the supraorbital periosteum. Microscopically this tumor so closely resembled an inflammatory exudation of round cells, that no prognosis could be assured. In two months, however, a recurrence of considerable size had taken place and this, also, was removed at operation. Exophthalmos and swelling of the lids followed, and the patient suffered much discomfort until three months later, when exenteration was performed. The immediate result was satisfactory, but the subsequent course is not known.

All of these occurrences are of great interest in showing that lymphoid tumors may, and many times have, occurred in tissues where lymph nodes are not found normally, and this is probably due to the fact that it is the most mobile type of tissue and variable in its distribution. Moreover, lymphosarcomata are found in other situations where they can not be explained on anatomic grounds, as in the testis. In this gland a few have been described, probably not more than twenty, but their morphology and behavior have been, as in this case, precisely that of the same class of tumors when they are primary in other parts of the body. In the testis, the possibility of a derivation from the lymphoid tissues of a teratoma has to be considered as, indeed, it does in the present instance. Confirmatory evidence, such as the finding of fetal tissue or organs in either testicular or orbital growths, is, however, lacking.

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EXOPHTHALMOS IN EXOPHTHALMIC GOITER; A STUDY OF 400 CASES.

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This is a summary of the course, symptoms and diagnosis of exophthalmic goiter with especial reference to the exophthalmos. The results of treatment upon the exophthalmos and other eye symptoms are also illustrated by a series of cases.

In the light of our present knowledge of exophthalmic goiter, the definition of this affection should read somewhat like this: *Exophthalmic goiter, (Graves' disease, Basedow's disease, Parry's disease, Flajani's disease, hyperplastic goiter, etc.,) is a chronic, rarely an acute dysfunction of the vegetative nervous system and the endocrin, organs, characterized by emotionalism, tachycardia, tremor, increased catabolism, dermographia, weakness, and usually also by exophthalmos and thyroid enlargement.* It is well to emphasize that exophthalmos and goiter are usually, but not always, present. In addition, the experienced clinician will elicit a history in which characteristic predisposing and exciting etiologic factors are more or less constant; also, he will find in the symptomatology certain gastrointestinal, genitourinary, respiratory, and miscellaneous symptoms commonly present in the typical syndrome of this disease. The essential fact to be remembered is, that tho a swollen thyroid and bulging eyes assist to render diagnosis an easier task, the absence of these signs does not preclude the presence of the disease.

TIME OF OCCURRENCE OF EXOPHTHALMOS.—I do not concur with Claiborne[1], who contends that exophthalmos is the first symptom to occur in exophthalmic goiter. Many subjects of this disease never present exophthalmos. Exophthalmos is, in the vast majority of instances, the first *eye* sign to be observed, if the patient is to present eye manifestations at all. Occasionally, an inconstant von Graefe's sign will precede the appearance of proptosis, and more rarely, the "hitch sign"[2] of the upper lid may be observed. Tho occasionally a patient will appear before his physician with exophthalmos as the only complaint, a careful examination will reveal the presence of heart hurry, tremor, dermographia, and other evidences of Graves' disease, which have developed prior to the exophthalmos, and which have occurred in such an insidious fashion as to have escaped the patient's attention.

The earliest occurrence of exophthalmos is seen when, following a sudden intense emotional strain, there is an acute onset of the disease. Thus, in a railroad accident, an earthquake, a conflagration, a shipwreck, and other situations in which life is in great peril, the picture of terror in an individual, with its staring eyes and trembling, the fleeting heart, the cold, clammy skin remains, becomes chronic, and the syndrome of the disease is complete. For example, a man of forty-five, while driving an automobile, suddenly struck a ditch in the road which wrecked the front part of his car. He was thrown with extreme violence, and when he was taken home, the family noticed that his eyes were protruding, his neck swollen, and skin covered with profuse perspiration. There was trembling all over, the patient at the same time complaining bitterly of palpitation. The condition persisting, the diagnosis of Graves' disease was readily made. A girl of eighteen, while enjoying herself in an amusement park, was thrown from a carrousel. She was taken home in a state of hysteria, and within a day or two, exophthalmos and all the other evidences of Graves' disease developed. A man of forty-seven was a passenger in an elevator which dropped nine floors. Tho he escaped without a scratch, the extreme terror of the experience persisted, and a diagnosis of typical Graves' disease was

made within a few days of the occurrence. A man of thirty-two, while employed in a munition factory during the war, heard an explosion which occurred in a neighboring building. He fell to the floor in a faint, and when he was examined, he was discovered to be in a state of acute Graves' disease. Many other illustrations could be given to show that exophthalmos could occur simultaneously with the other symptoms characterizing the disease.

Course of Exophthalmos in Graves' Disease.—In patients presenting exophthalmos during the disease, the following is the usual course of events: More or less insidiously, the patient is observed to become restless and emotional, there may be palpitation on slight exertion, a feeling of trembling and weakness in the lower limbs, excessive moisture of the skin, and a beginning loss in weight. Soon it is noticed that when the patient enters into conversation or concentrates attention upon an object, the eyes present an unusual stare, a rim of sclera appearing above and below the cornea. These signs and symptoms becoming aggravated, the relatives and friends begin to remark that the patient is "queer." The physiognomy assuming in course of time the characteristic expression of fright, the more timid acquaintances, especially children, may hesitate to come near him.

Especially is this true when it is observed that simultaneously with the occurrence of distinct exophthalmos, the behavior of the individual is singularly altered; thoughts and emotions succeed each other with irrelevant sequence and rapidity; motility also is quickened, so that those about him are unable to divine what may be the next move of the patient. Objectively, there is something wrong. Subjectively, the patient may still feel normal, or perhaps physically and mentally exhilarated. More often, however, the patient is cognizant of weakness, especially in the lower limbs, a constant moisture of the skin, loss in weight in spite of a good appetite, a feeling of trembling all over the body, and nervousness. The neck garments may or may not become tight, tho the remainder of the body is becoming emaciated.

Sooner or later, the exophthalmos becomes subjective, for, on glancing in the mirror, there is the sudden discovery that the eyes are bulging. The patient may at this time appear in the doctor's office with exophthalmos as the only complaint; or, the proptosis may have been discovered by the physician prior to this time, if the patient had already appeared before him complaining of other symptoms. Exophthalmos may occur later in the disease, i. e., when the syndrome is fairly well advanced. It is in this class of patients, especially when there is an absence of thyroid enlargement, that the diagnosis is frequently belated, and the necessary treatment is attempted only after serious damage has occurred to the vital organs.

Degrees of Exophthalmos. — In these observations, the exophthalmometer was not employed. Tho this instrument is useful in estimating changes occurring in the course of a very evident exophthalmos, it is not a reliable guide as indicator of the presence or absence of proptosis of less evident degree. In many instances, it fails to indicate exophthalmos when the patient's relatives and medical attendant are convinced of its presence. Accordingly the usual inspectional method was employed, and the terms "slight," "moderate," "marked," and "extreme," were used to indicate the degree of exophthalmos observed.

Exophthalmos is the most dramatic expression of Graves' disease. It is accentuated by conversation, active attention, physical and mental excitation, menstruation, pregnancy, and fatigue. The 400 cases herein reported were studied during the years 1918 to 1921 inclusive. Incidentally, in some of these patients, certain conditions peculiar to the World War bore a direct or indirect etiologic relationship to the syndrome.

EXOPHTHALMOS AND AGE OF PATIENT.

Age of Patients—	Under 10 years	10 to 15 years	15 to 20 years	20 to 30 years	30 to 40 years	40 to 50 years	50 to 60 years	60 to 70 years	70 to 75 years	Total
No exophthalmos	1	3	10	11	5	6	2	1	..	39 (9¾%)
Exophthalmos on attention only	1	2	12	12	10	7	2	..	..	46(11½%)
Slight exophthalmos	..	3	13	26	12	6	1	1	..	62(15½%)
Moderate exophthalmos	3	12	18	34	7	9	4	4	1	92 (23%)
Marked exophthalmos	..	5	15	30	10	7	6	2	2	77(19¼%)
Extreme exophthalmos	..	2	2	16	3	2	2	1	..	28 (7%)
Unequal exophthalmos (greater in right eye)	..	3	2	3	3	1	1	..	..	13 (3¼%)
Unequal exophthalmos (greater in left eye)	..	2	2	5	2	..	1	..	..	12 (3%)
Unilateral exophthalmos (right eye only)	..	4	4	4	1	3	..	1	..	17 (4¼%)
Unilateral exophthalmos (left eye only)	..	2	2	6	1	1	1	..	1	14 (3½%)
Total number of patients	5	38	80	147	54	42	20	10	4	400

Exophthalmos may not be severe enough to occasion serious damage to the ocular mechanism. In most instances, the conjunctiva is somewhat congested, occasioning little or no discomfort to the patient. Vision, too, is uninfluenced. In instances where the eyes bulge markedly, tho the eyelids may still be able to close over the eyeball, this is accomplished with difficulty. Such patients commonly experience a burning sensation of the eyeballs, early fatigue of vision, excessive dryness or excessive moisture of the conjunctiva, and a varying grade of chronic conjunctivitis.

In a small percentage of patients, the exophthalmos is extreme, reaching the point at which the eyelids are incapable of coaptation, so that the patient cannot close the eyelids on retiring. It is then that serious trouble may begin, for the eyeball cannot long withstand the absence of the protection offered them by the lids. In some cases, a mere thirty-second of an inch is lacking to form complete coaptation, while in others, the eyes remain permanently open night and day, the lids being incapable of closing to within half an inch or more. This frequently leads to corneal ulcers and opacities, with varying degrees of impairment of vision. In a few of my patients, the habit of placing a small pad of gauze or flannel over each eye before retiring served as a protection against irritation during sleep.

Unprotected eyeballs are indeed a causal factor in the insomnia common to patients with Graves' disease. In an instance brought to my attention, the patient's exophthalmos was aggravated to the point of ocular dislocation by the administration on the part of an inexperienced attendant of thyroid extract gr. v, t. i. d. Unilateral, then bilateral ophthalmitis developed, the subsequent panophthalmitis becoming so severe as to require a double eyeball enucleation in order to save the patient's life.

Ordinarily, the moderate or marked exophthalmos in these patients remains a more or less constant factor with little variation in degree, until the syndrome is terminated. In a not inconsiderable percentage of patients, the course of the disease is lengthened in duration to eight, ten, or more years, often with a reduction in its severity. In such instances, the exophthalmos, if marked or extreme, in course of time becomes less severe, with usually an accompanying edema of the upper and lower lids. This edema may be local, due to chronic congestion of the orbital tissues, or it may be an evidence of circulatory decompensation. Occasionally, the edema is due to both the local and general causes.

EXOPHTHALMOS AND OTHER EYE SIGNS.—That the Dalrymple, von Graefe, Stellwag, Moebius, and other eye signs are dependent upon the existence of exophthalmos, is believed by Claiborne and others. In this series of cases there is an apparent confirmation of this view, for in nearly all instances of unmistakable exophthalmos the usual eye signs were present in varying degree. An apparent contradiction, however, seems to present itself when we observe a von Graefe in some

DEGREES OF EXOPHTHALMOS COMMONLY SEEN IN EXOPHTHALMIC GOITER.

Fig. 1.—(Referred by Dr. M. E. Smukler, Philadelphia.) Congenital exophthalmos in female aged 14.

Fig. 2.—Same patient as Fig. 1. No subjective or objective symptoms pertaining to an endocrinopathy.

Fig. 3.—Slight exophthalmos in young World War veteran, with Graves' disease of 1 year's duration.

Fig. 4.—(Referred by Dr. L. H. Jacob, Philadelphia.) Moderate exophthalmos in female of 16 with Graves' disease of 1 year's duration.

Fig. 5.—Moderate asymmetric exophthalmos in female of 55 with early Graves' disease.

Fig. 6.—(Referred by Dr. H. S. Bikoff, Brooklyn.) Moderate exophthalmos in female of 20, with Graves' disease of 8 years' duration.

Fig. 7.—Moderate exophthalmos with edema of eyelids in male of 41 with Graves' disease of 10 years' duration, auricular fibrillation, and beginning cardiac decompensation.

Fig. 8.—Slight exophthalmos of right eye in female of 22, with *forme fruste*.

Fig. 9.—Same patient as Fig. 8, 17 years later, seen with Dr. C. Goss, Philadelphia. Symmetric moderate exophthalmos; edema of eyelids; marked myocardial degeneration with beginning decompensation.

Fig. 10.—(Referred by Dr. D. P. Boyer, Philadelphia.) Moderate exophthalmos in female of 59, with Graves' disease of 8 months' duration.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

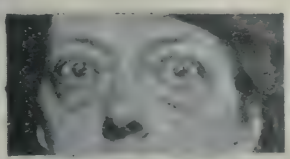

Fig. 9

Fig. 10

DEGREES OF EXOPHTHALMOS COMMONLY SEEN IN EXOPHTHALMIC GOITER.
(Continued)

Fig. 11.—(Referred by Dr. A. L. Schaller, Philadelphia.) Moderate exophthalmos in female of 21, with Graves' disease of 1 year's duration.

Fig. 12.—(Kind permission of Dr. Hobart A. Hare, Jefferson Medical College.) Moderate exophthalmos in female of 17, with Graves' disease of approximately 2 years' duration.

Fig. 13.—(Referred by Dr. C. A. Young, Philadelphia.) Moderate exophthalmos in female of 25 with Graves' disease of 7 years' duration.

Fig. 14.—(Referred by Dr. Edith M. C. Weber, Philadelphia.) Moderate exophthalmos in female of 27 with Graves' disease of approximately 3 years' duration. The patient, tho laughing, still presents evident proptosis.

Fig. 15.—(Seen with Dr. M. Korshet, Passaic, N. J.) Marked exophthalmos in female of 38, with Graves' disease of 10 years' duration. Note edema of eyelids.

Fig. 16.—Marked exophthalmos in male of 27 with Graves' disease of 3 years' duration. Slight edema of eyelids.

Fig. 17.—(Referred by Dr. J. J. Stanton, Philadelphia.) Marked exophthalmos in female of 45 years, with Graves' disease of 3 years' duration. Moderate edema of eyelids.

Fig. 18.—Extreme asymmetric exophthalmos in male of 28 years with Graves' disease of 9 months' duration. Edema of eyelids.

Fig. 11

Fig. 12

Fig. 13

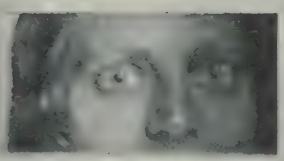

Fig. 14

Fig. 15

Fig. 16

Fig. 17

Fig. 18

patients in whom exophthalmos is absent.

Exophthalmos and Goiter Incidence.—The tendency toward goiter formation seems greater in patients with exophthalmos than in those without; perhaps the reverse may also be stated, i. e., the tendency to exophthalmos is greater in those with thyroid swelling than in those whose thyroid is normal in size.

Relationship of Exophthalmos to Goiter in Graves' Disease:

	No Exophthalmos Present	Exophthalmos Present	Total
No thyroid enlargement	22 (5.5%)	56 (14%)	78 (19.5%)
Slight thyroid enlargement	4 (1%)	84 (21%)	88 (22%)
Moderate thyroid enlargement	8 (2%)	103 (25.75%)	111 (27.75%)
Marked thyroid enlargement	5 (1.25%)	98 (24.5%)	103 (25.75%)
Extreme thyroid enlargement		20 (5%)	20 (5%)
Totals	39 (9.75%)	361 (90.25%)	400 (100%)

There seems to be no relationship between unilateral or asymmetric exophthalmos and unilateral thyroid enlargement. A right sided exophthalmos, or a right sided accentuation of exophthalmos, may exist just as often with a symmetric thyroid enlargement as with an enlargement of the right or of the left lobe only of the organ. In other words, the symmetry or asymmetry of the exophthalmos seems to bear no relation to the symmetry or asymmetry of the thyroid enlargement.

Exophthalmos and Severity of the Disease.—The degree of exophthalmos bears no definite relation to the severity of the syndrome of the disease. While we often observe a more severe course of the disease in patients with marked exophthalmos than in those with little or no bulging of the eyes, exceptions to this are so often seen, that one should hesitate to state percentages or suggest rules in this regard. Very severe instances of the disease with auricular fibrillation and with cardiac decompensation are often seen in patients who never, at any time, present either exophthalmos or goiter. In fact, so often is this observed, that one is tempted to call this class of patient a definite type of the disease. The basal metabolism may frequently appear much higher in a patient with slight or no exophthalmos than in one whose eyes seem to pop out of their orbits. In general, it may be said that a patient with slight or moderate exophthalmos and thyroid swelling is usually a subject of Graves' disease of average severity. Exceptions *pro* and *con* are numerous.

Exophthalmos and Age of Patient.—No relationship seems to exist between the age of the patient and the probable development of exophthalmos during the course of Graves' disease.

With regard to the degree of exophthalmos, it might be said that in very young subjects of Graves' disease, (under 10 years of age), there is apt to be slight or moderate exophthalmos. As we approach puberty, adolescence, and go on to patients in early adult life, bulging of the eyes becomes more prominent. Past the age of 40, the tendency towards moderation of exophthalmos becomes manifest.

Exophthalmos and Sex.—The sex incidence in this series of cases differs somewhat from statistics of other observers. Of the 400 cases, 136 or 34 percent occurred in males. Of the 39 patients without exophthalmos, 18 were males,—13.2 percent of the total number of male patients, and 21 were females,—7.9 percent of the total number of female patients. This would indicate that during the course of Graves' disease, females are more apt to develop exophthalmos than males.

Exophthalmos and Thyroid Adenoma.—Toxic adenoma is to be differentiated from exophthalmic goiter by the absence in the former of exophthalmos* and other eye signs characterizing the latter. There are many

*Tho exophthalmos is absent in toxic adenoma, one may frequently observe a stare in these patients, without the von Graefe and other eye signs commonly seen in Graves' disease. This is not due to the hyperthyroidism, but to the impaired circulation to the head and eyes from pressure upon the cervical blood vessels by the adenoma, if the tumor be large. Staring eyes may also be observed without thyrotoxemia in instances of pressure due to intrathoracic goiters, giving rise to the socalled "mechanical goiter heart," in which dyspnea is a distressing feature.

other clinical differences between toxic adenoma and exophthalmic goiter which might be mentioned were this paper dealing with diagnosis. We must bear this important fact in mind: A person with a simple or nontoxic goiter may develop exophthalmic goiter with or without exophthalmos quite as readily as any one else. Presented with a patient who reveals all the signs and symptoms of Graves' disease, but in whom there is an adenoma over the thyroid, we must not conclude that we are dealing with a case of toxic adenoma with exophthalmos. This patient, on final analysis, may be suffering with a hyperplasia of the formerly normal thyroid tissue behind the adenoma, associated with the generalized neuroendocrin dysfunction characterizing Graves' disease. In such an event, the presence of the adenoma is merely coincidental and plays no part in the etiology of the syndrome. It must be stated that, in the absence of exophthalmos and the presence of a coincidental adenoma, the differentiation between toxic adenoma and Grave's disease is rather difficult.

Exophthalmos in Laughter.—Tho the picture of chronic fright is typical of the facies of patients with exophthalmic goiter, it is not difficult to make them laugh. In fact, in these ultraemotional patients, the alternation of frowns and moroseness with laughter occurs frequently with little or no substantial cause. Now, in a normal individual during laughter, the muscles about the eyes contract in such manner as to cause the lids partly to close over the eyeballs; in many persons this occurs to such degree that the eyes are almost closed. Such is not the case in patients with marked exophthalmos,—the eyes still stare almost as much as ever during laughter, rendering the individual's expression an odd combination of mirth attempting to temper the expression of fear.

Rôle of Ophthalmologist in Graves' Disease.—In view of the part played by the eyes in the greater percentage of cases of exophthalmic goiter, it can readily be seen that the cooperation of the ophthalmologist is not only desirable, but often vital, in the management of a subject of Graves' disease. The maintenance of a healthy conjunctiva, the prevention of corneal ulcers and opacities, the correction of refractive errors with its conservation of nervous energy, the occasional examination of the fundus to detect any changes suggesting circulatory and renal complications or an intercurrent diabetes,—this is the important rôle of the oculist whose services should always be considered as a necessary constituent in the rational outline of the treatment of these patients.

Results of Treatment.—When, thru successful therapeusis, amelioration of symptoms begins, the following is the usual sequence of improvement: The heart rate is diminished, palpitation disappears, nervousness is reduced, sleep is improved, weight is increased, and there is a beginning general sense of well being. The thyroid swelling, if present, may at first slightly decrease in size, but usually does not shrink until some time after improvement occurs elsewhere, and depending upon the chronicity of the affection, may not become normal for months following the disappearance of cardiac, nervous, and nutritional signs and symptoms. The same may be said of exophthalmos. The protrusion of the eyeballs is reduced markedly during the satisfactory course of therapeutic events to such a point that the expression of fright no longer exists; but for pathologic reasons within the orbit itself, complete disappearance of exophthalmos may not occur for several months or a year or more following the disappearance of all other active manifestations of Graves' disease. This does not mean that the patient has not recovered; it merely indicates that the process of absorption of a pathologic redundancy of retroorbital fat, blood vessels, and other factors, real or hypothetic, is a very slow procedure. The facility with which this process occurs depends in large measure upon the previous duration or chronicity of the affection. In a patient cured of a Graves' disease of one

RESULTS OF TREATMENT.

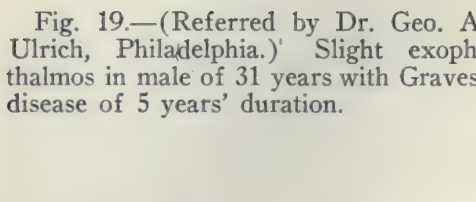

Fig. 19.—(Referred by Dr. Geo. A. Ulrich, Philadelphia.) Slight exophthalmos in male of 31 years with Graves' disease of 5 years' duration.

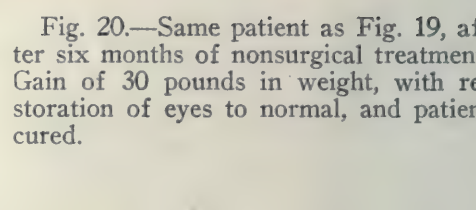

Fig. 20.—Same patient as Fig. 19, after six months of nonsurgical treatment. Gain of 30 pounds in weight, with restoration of eyes to normal, and patient cured.

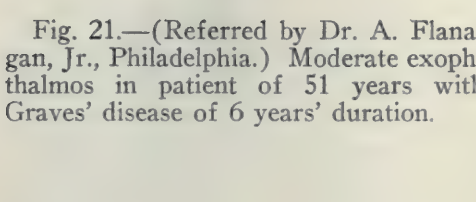

Fig. 21.—(Referred by Dr. A. Flanagan, Jr., Philadelphia.) Moderate exophthalmos in patient of 51 years with Graves' disease of 6 years' duration.

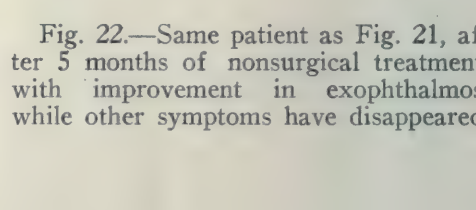

Fig. 22.—Same patient as Fig. 21, after 5 months of nonsurgical treatment, with improvement in exophthalmos, while other symptoms have disappeared.

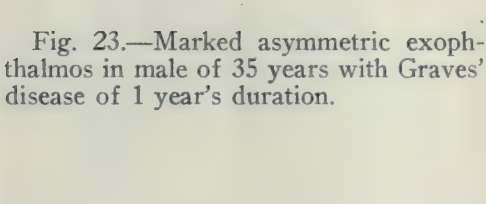

Fig. 23.—Marked asymmetric exophthalmos in male of 35 years with Graves' disease of 1 year's duration.

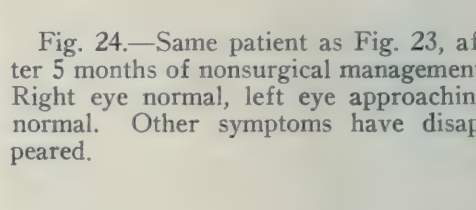

Fig. 24.—Same patient as Fig. 23, after 5 months of nonsurgical management. Right eye normal, left eye approaching normal. Other symptoms have disappeared.

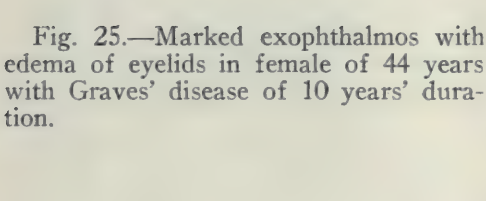

Fig. 25.—Marked exophthalmos with edema of eyelids in female of 44 years with Graves' disease of 10 years' duration.

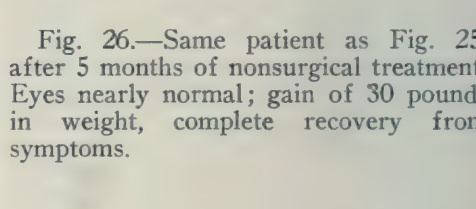

Fig. 26.—Same patient as Fig. 25, after 5 months of nonsurgical treatment. Eyes nearly normal; gain of 30 pounds in weight, complete recovery from symptoms.

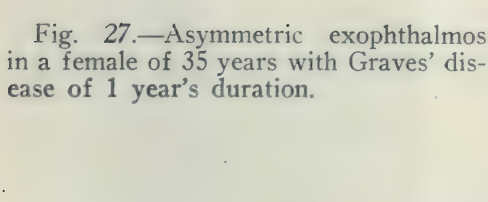

Fig. 27.—Asymmetric exophthalmos in a female of 35 years with Graves' disease of 1 year's duration.

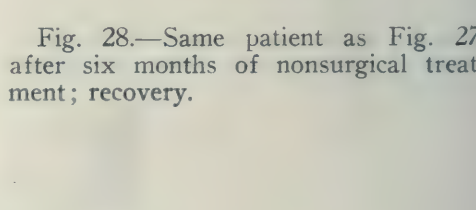

Fig. 28.—Same patient as Fig. 27, after six months of nonsurgical treatment; recovery.

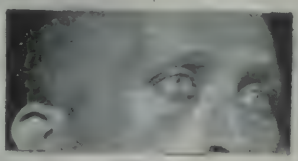

Fig. 19

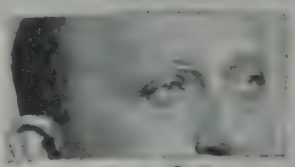

Fig. 20

Fig. 21

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 26

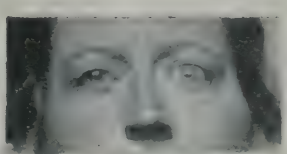

Fig. 27

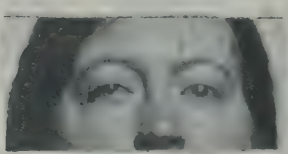

Fig. 28

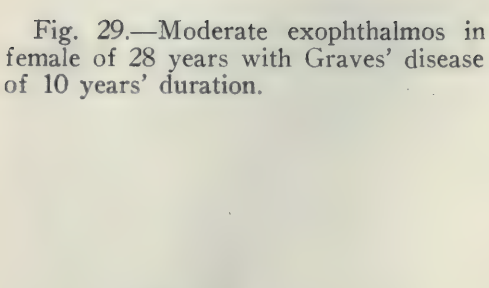

Fig. 29.—Moderate exophthalmos in female of 28 years with Graves' disease of 10 years' duration.

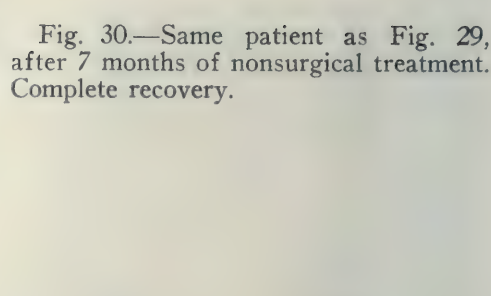

Fig. 30.—Same patient as Fig. 29, after 7 months of nonsurgical treatment. Complete recovery.

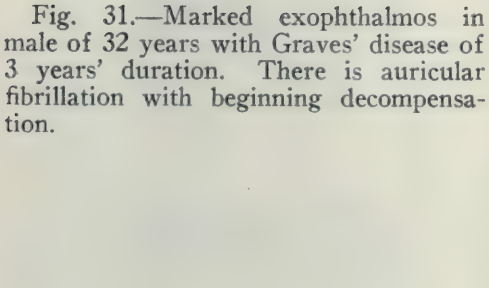

Fig. 31.—Marked exophthalmos in male of 32 years with Graves' disease of 3 years' duration. There is auricular fibrillation with beginning decompensation.

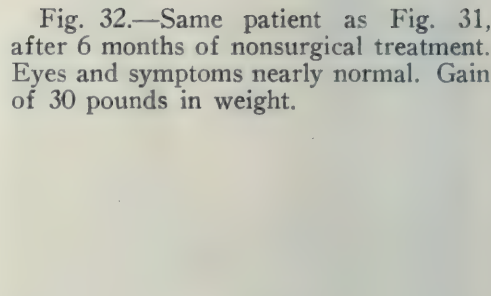

Fig. 32.—Same patient as Fig. 31, after 6 months of nonsurgical treatment. Eyes and symptoms nearly normal. Gain of 30 pounds in weight.

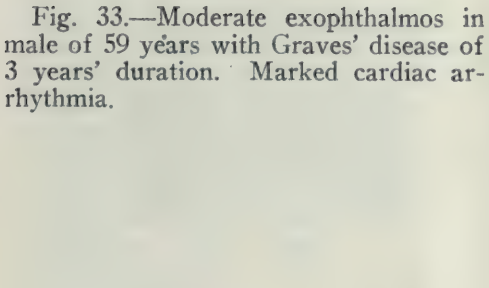

Fig. 33.—Moderate exophthalmos in male of 59 years with Graves' disease of 3 years' duration. Marked cardiac arrhythmia.

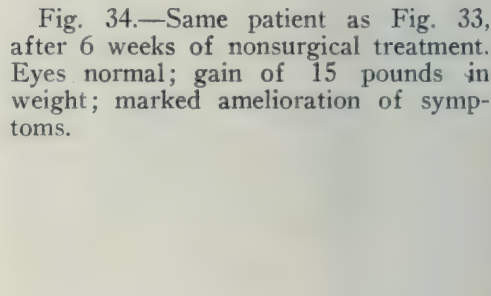

Fig. 34.—Same patient as Fig. 33, after 6 weeks of nonsurgical treatment. Eyes normal; gain of 15 pounds in weight; marked amelioration of symptoms.

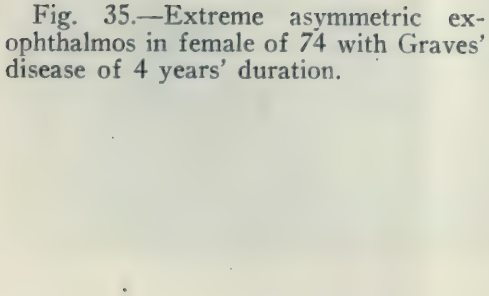

Fig. 35.—Extreme asymmetric exophthalmos in female of 74 with Graves' disease of 4 years' duration.

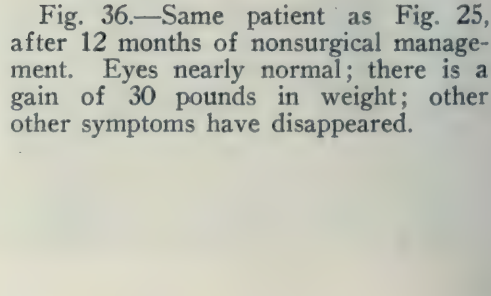

Fig. 36.—Same patient as Fig. 25, after 12 months of nonsurgical management. Eyes nearly normal; there is a gain of 30 pounds in weight; other other symptoms have disappeared.

Fig. 29

Fig. 30

Fig. 31

Fig. 32

Fig. 33

Fig. 34

Fig. 35

Fig. 36

year's duration, the exophthalmos may disappear within six months to a year following the institution of treatment. In one having suffered with Graves' disease for ten or more years, the eyes may not resume their former appearance for two or three years following recovery from the disease. Sooner or later, however, the exophthalmos disappears, and the eyes are restored to their normal appearance.

CONCLUSIONS:—In this series of 400 cases of Graves' disease reported, the following deductions may be drawn with respect to exophthalmos:

1. Exophthalmos (and goiter) are not essential to diagnosis.

2. Exophthalmos rarely if ever precedes, occasionally occurs simultaneously with, but usually follows the appearance of other characteristic manifestations of the disease.

3. Tho in the average patient vision is usually unimpaired, exophthalmos, if extreme, may lead to partial or complete blindness thru corneal ulcers and opacities, and occasionally may even endanger life thru panophthalmitis.

4. Exophthalmos is probably the basis upon which all other eye signs commonly observed in Graves' disease depend.

5. Patients without goiter are less apt to present exophthalmos than those with a degree of thyroid enlargement; the corollary to this is also evident, i. e., patients without exophthalmos are less apt to develop thyroid swelling than those already presenting proptosis.

6. While marked and extreme exophthalmos are commonly seen as a constituent of a very severe picture of Graves' disease, the reverse is so often the case that no definite general relation could be stated to exist between the degree of exophthalmos and the severity of the clinical syndrome.

7. Tho usually symmetrically bilateral, exophthalmos is often asymmetrically bilateral, and occasionally primarily or persistently unilateral. The symmetry or asymmetry of exophthalmos bears no relation to the symmetry or asymmetry of thyroid enlargement.

8. Exophthalmos in Graves' disease occurs somewhat more frequently in females than in males.

9. The services of an ophthalmologist are often a necessary part of the broad management of the disease.

10. Exophthalmos, during the process of recovery, is usually the last sign of the disease to disappear.

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AGRICULTURAL CONJUNCTIVITIS.

JAMES M. PATTON, M.D., and SANFORD R. GIFFORD, M.D.

OMAHA, NEBRASKA.

The six cases here reported are sufficiently alike to constitute a clinical group. All the patients were adult or adolescent males engaged in out door occupations, which suggested the name proposed. Bacteriologic investigations showed mixed infection in all. A large gram positive anaerobic bacillus found in 5 of them is possibly an etiologic factor. They were characterized by enormous swelling of the lids, swelling of the adjoining lymph nodes, superficial necrosis of the skin of the lids and pseudomembranous deposit on the conjunctiva. The cases were studied in the Department of Ophthalmology, University of Nebraska, College of Medicine. The paper was presented to the Section on Ophthalmology of the American Medical Association, June, 1921, and is published here thru the courtesy of the Journal of the A. M. A.

During the last year, we have seen six cases of a type of conjunctivitis, unique in our experience, which presented enough clinical features in common to justify their presentation in a group, with the idea of determining whether or not they form a distinct clinical entity.

REPORT OF CASES

CASE 1.—*History.*—W. G., a farmer, aged 17, first seen May 23, 1920. About five days before, he had noticed a swelling of the cervical glands on the right side. The swelling seemed to extend upward, and a day or two later, the right eyelids began to swell rapidly. The pain was not marked, but considerable discharge was present.

Examination.—Both lids of the right eye, especially the upper were swollen to such an extent that they could be opened only a few millimeters. They were deeply congested, hard and hot. The preauricular and cervical glands were markedly enlarged and tender. The skin of the lower lid showed several grayish areas, 6 to 10 mm. in diameter, which resembled small flat pustules. On opening one of these, only a whitish caseous material was found. There was a similar area on the skin about each canthus, which remained excoriated and bleeding for some days, and the skin of the lid border was covered with a closely adherent membrane. The palpebral conjunctiva, where it could be seen, was covered with a similar thick membrane. The bulbar conjunctiva was thickened and congested but showed no membrane. The temperature on admission was 101.4 F., 99.8 the following day, and on subsequent days reached 99 almost every day, until a few days before dismissal. In spite of this, the leucocyte count was only 8,000.

Clinical Course.—Under frequent hot applications and instillations of argyrol, the swelling of the lids and glands gradually subsided. The membrane slowly disappeared and the pustules, after the superficial layers had sloughed off, healed up, leaving slight scarring. Zinc oxid was kept constantly applied to the skin of the lids under a loose dressing. One week after admission, a small erosion appeared near the center of the right cornea which persisted for same days, in spite of cauterization with trichloracetic acid, until the area was curetted, when it healed up rather promptly.

He was dismissed after twenty days, with the right cornea showing a slight leucoma and considerable conjunctival thickening, but no membrane. A letter from his family physician, Dr. Cole, some months later, reports some thickening of the lids, slight congestion and excellent vision.

CASE 2.—*History.*—M. L., a farmer, aged 31, seen Sept. 16, 1920. About a week before, while working in the fields, he thought a piece of chaff had blown into his eye. His family physician had removed this, and the eye had felt fairly comfortable until about two days before he came in, when the lids of the right eye had begun to swell markedly.

Examination.—There was a hard, brawny swelling of the lids of the right eye. The lids could be separated with difficulty, scarcely sufficiently to

allow one to see the cornea. The preauricular and superior cervical lymph nodes were enlarged, so that the whole side of his face appeared swollen. The palpebral and bulbar conjunctiva were covered, as far as could be seen, with grayish exudate. A few small pieces of this were removed for examination. They were firmly adherent, leaving a slightly bleeding surface on removal. No foreign body was found, and as far as could be seen, the cornea was normal. A few small areas like those in Case 1, but not so extensive, were seen about the internal angle,

Fig. 1 (Case 3).—Appearance of eye at the time of examination.

on both lids and on the cheek below the eye. The temperature on admission was 99.4 F., and continued between 99 and 100 for about three days.

Treatment and Results.—The smears showed organisms resembling pneumococcus. In addition to instillations of zinc collyrium and 10 per cent. argyrol, 5 per cent. ethylhydrocuprein (optochin) was instilled four times a day, with frequent applications of heat and zinc oxid to the skin lesions. On the third day, one injection of 50 c.c. of polyvalent antipneumococcus serum was given intravenously. The swelling of the lids and the glands slowly subsided, so that the eye could be opened, and the membrane gradually became detached. About the tenth day, a small erosion developed on the lower inner quadrant of the cornea, which healed under atropin and heat in two or three days. When he was sent home, September 30, there was still considerable thickening of the conjunctiva but no membrane, and a localized corneal haziness which reduced his vision to 20/70.

Case 3.—*History.*—F. H., a farmer, aged 49, a neighbor of the patient in Case 2, seen Oct. 18, 1920. Two weeks before, while haying, he got some dust in his right eye. The eye was slightly red, and after a week, his home physician removed a small foreign body from his eye. After a day or so, he noticed a swelling of his lids, and for three days before coming in, he had been unable to open them.

Examination.—There was an enormous hard, brawny swelling of both lids of the right eye. The cornea was indistinctly seen but apparently intact. The preauricular and submaxillary glands were enlarged and hard. There was a small pustule, one-half inch below the center of the lower lid border. The lids could be opened slightly, enough to allow one to see that both lids were covered with a thick membrane coming up close to the cornea and extending out from the lid borders (Fig. 1). Small portions of the membrane were removed, but no attempt was made to find a foreign body.

Treatment and Results.—The patient was put on boracic irrigations every two hours, 5 per cent. optochin every two hours, and thirty grains of sodium salicylat, three times a day. For the first few days, the brawny swelling became even harder, so that the lids could not be opened at all. After a week, they could be opened slightly, so that the membrane was seen to extend to the limbus and slightly overlap the cornea all around. After ten days, a superficial ulceration appeared on the cornea, which eventually included most of the upper half. The patient's temperature was 99.6 F. on admission, 101.2 during the second day, and reached 100 on the four succeeding days, after which it dropped to 99 for two days and then to normal.

For personal reasons, he was obliged to go home on the thirteenth day with the swelling mostly gone, but with marked adhesions of the upper folds,

a haze involving the upper half of the cornea and vision of hand movements at one foot. Dr. Malster, five months later, states that there is still considerable thickening of the lids and some ptosis; the conjunctiva is inflamed, with a tendency in certain parts to be granular. He also reports that the cornea is quite cloudy, the pupil is not easily outlined and there is a pseudopterygium on the inner side, running to the edge of the iris and quite congested. Also the rest of the eyeball is still quite red. Vision is hand movements.

On March 24, 1921, he returned, when the condition shown in Figure 2 was seen. There were adhesions of the lids to the globe both above and below, with a thick vascular tissue covering about three-fourths of the cornea, leaving a clear area up and out, however, thru which 3/200 vision could be obtained.

Case 4.—*History.*—W. M., aged 11, a farmer's son, was referred Oct. 31, 1920. The week before, he had noticed that the right eye was a little inflamed. It remained so for two or three days, when the lids began to swell rapidly. He gave no history of trauma.

Examination.—When first seen, the skin and subcutaneous tissue of the entire upper lid was necrotic and covered with a grayish exudate, with crusting over the central portion. There were several discrete flat yellowish pustules on the side of the nose below the lower lid, and on the brow above the upper lid, from 7 to 8 mm. in diameter. There was marked swelling and redness of the tissues from the ear to the external angle, extending down nearly to the angle of the jaw (Fig. 3). No attempt was made to separate the lids, but the patient was unable to open them even slightly. His temperature was 101.2 F. on admission, reached 100 and 99.4 on two successive days, and then dropped to normal.

Treatment and Results.—He was given frequent applications of moist heat, and a moist lead lotion dressing was kept constantly applied. When his eye could be opened, he was given instillations of weak zinc collyrium and yellow mercuric oxid ointment. About the tenth day, a small superficial corneal erosion appeared on the cornea of the other eye, with only moderate congestion of the conjunctiva and no secretion or involvement of the lids. This cleared promptly on local applications. While he was under treatment, several new pustules developed on the lower lid which healed without any scarring. On dismissal, the area of superficial necrosis over the upper lid had begun to heal in considerably at the edges,

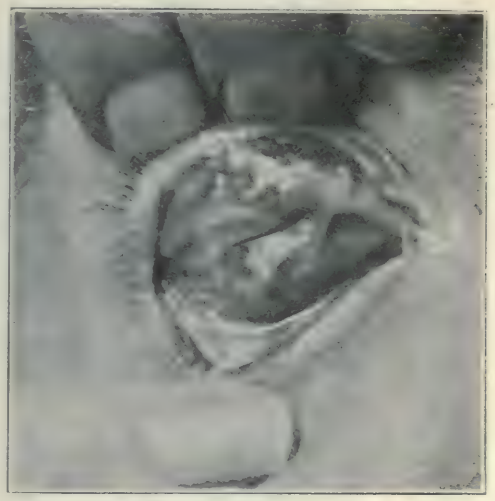

Fig. 2 (Case 3).—Appearance of eye after four months.

and clean granulations covered the ulcerated portion. His vision was 20/20 with correction in each eye. No membrane was ever observed, but during the first week, it was impossible to get a view of the conjunctival surface.

Case 5.—*History.*—W. D., aged 16, first seen Dec. 26, 1920. A few days before he first noticed the symptoms, he had been employed in clearing up a patch of dry weeds near his home. For the last week, his right eye had been inflamed, and for three days he had been under treatment by another oculist, who had given him argyrol instillations.

Examination.—When first seen, both lids were somewhat swollen but could be opened. The palpebral conjunctiva was markedly thickened. The ocular conjunctiva was chemotic, and the eye

could be moved only a few millimeters in any direction. The preauricular and submaxillary glands were palpable but not tender. The temperature was normal, but he stated that he had had chills and fever several times during the last few days. He was told to continue treatment with the addition of frequent applications of moist heat. He did not report the next day as directed, but on the third day presented himself with a swelling of the lids so extreme, that they could be opened only slightly. The upper lid was hard and hot. The preauricular and submaxillary glands were much more swollen and tender. There was a moderate amount of mucopurulent discharge in the sac, but no pustules on the lids or evidence of membrane (Fig. 4).

Treatment and Results.—Under frequent applications of moist heat, weak zinc and boracic instillations and atropin, the swelling of the lids decreased rather promptly, so that in a week he was able to open his eye about one-third of the normal extent. After this, there was still considerable swelling at the outer angle of the lid, and the conjunctiva remained congested and showed a peculiar follicular hypertrophy near the outer angle, which was still apparent two months later, tho the ocular conjunctiva was normal and the eye was perfectly comfortable. The cornea was never involved, and his

Fig. 3 (Case 4).—Appearance of eye at the time of examination.

vision remained 20/15. The temperature during the first three days at the hospital was 99 F., after which it dropped to normal.

CASE 6.—*History.*—D. R., aged 9, the son of a farmer, was referred to us, Jan. 12, 1921. While playing with other children, he had scratched the skin of the right upper lid with a weed. After three or four days, the lid began to become red and the redness increased for two weeks. It began to swell rapidly two days before coming in.

Fig. 4 (Case 5).—Appearance of eye at time of examination.

Examination.—There was very marked brawny swelling of the upper lid, which hung down over the lower. The skin was tense and red with a moderate purulent discharge from the sac. The preauricular glands were moderately enlarged but not particularly tender. Extending from above the inner canthus down to and including the lower lid, there were several small flat discrete lesions such as have been described in the other cases (Fig. 5). There was no attempt made to separate the lids, but a characteristic membrane protruded below the lid margin.

Treatment and Results.—This consisted of heat and irrigations. The swelling reacted promptly to treatment, so that after the fourth day, we were able to get a fairly good view of the lower portion of the cornea. Two days later, the lids had opened sufficiently, so that all of the cornea could be seen and was perfectly clear. The next day, however, on examining the cornea, the lower one-third was found to be decidedly hazy, due, evidently, to improper coaptation of the lids. This cleared up on keeping the cornea thoroly protected with petrolatum.

The symptoms rapidly sudsided and he was discharged on the fifteenth day, but returned a week later for examination, at which time, in spite of considerable thickening of the conjunctiva and photophobia, he had vision of at least 20/50. His temperature on admission was 100 F. and ranged up to 99 for ten days. A report from Dr. Zimmerman six weeks later stated that there was still a slight thickening of the upper lids, the conjunctiva was very slightly injected, and vision was practically normal. The doctor reported that he has known of no diphtheria, or of any cases suspected of being such, in the surrounding country for the last two or three years.

CLINICAL SUMMARY

These cases, with the exception of Case 5, which was seen very early, and possibly Case 4, in which we were unable to turn the lids until the healing process was well advanced, presented very pronounced swelling and redness of the lids, involvement of the regional lymph nodes, the presence of more or less extensive skin lesions, and a dense and decidedly adherent false membrane involving both the palpebral and bulbar conjunctiva. There was a varying degree of superficial keratitis, which in no case went on to perforation, altho in Case 3 there was a very dense vascular scar involving nearly all of the cornea. All ran a temperature of from 99.5 to 101 F. at the start, dropping in a few days to normal. In all, the serious condition was monocular, tho one patient (Case 4) showed catarrhal conjunctivitis of the other eye. Our cases were all in males, ranging from 9 to 49 years of age, who were all engaged in some form of rural pursuit. Three patients gave a history of some slight trauma-

tism. It is interesting to note that four of our six patents were from the same general locality, and two of the patients reported by correspondence were from one other locality.

All cases yielded to heat and frequent instillations of mild collyria, and, except as mentioned before, healed with very little impairment of vision.

Fig. 5. (Case 6.) Appearance of eye at time of examination.

No antitoxin was given, as we were unable in any case to find evidence of B. diphtheriae, nor were we able to get a history of any exposure to this disease.

Since we had seen no similar cases reported from other districts, a questionnaire was sent to about three hundred general practitioners and oculists in the northern Missouri valley. Of sixty-four who replied, forty-six had seen no similar cases. Several of the remaining eighteen who reported cases did not give symptoms in sufficient detail to enable us to form an exact idea as to the nature of the condition. A number reported cases of acute conjunctivitis with unusual swelling of the lids but without membrane or skin lesions. Three cases were apparently episodes in the course of unusually severe trachoma, and one case was apparently Parinaud's conjunctivitis. Three cases, however, were of sufficient resemblance to warrant describing them in detail. One seems to be an exact counterpart of the cases we have seen.

The case reported by Drs. Caton and Starr of Concordia, Kan., was that of a farmer engaged in gathering his harvest when the infection took place. "The left eye only was involved, the upper lid being highly purple and

sagging over the lower. Large patches of membrane were present both on the bulbar and palpebral conjunctiva. The right eye was never involved. The cornea showed no involvement but a slight haziness, which we thought was due to pressure." This patient did not remain for treatment, but it was subsequently learned that he recovered.

Dr. E. N. Robertson, also of Concordia, Kan., reported the case of a farmer, aged 58, who was working with horses. "He stated that four days previous to coming to our office, he woke with his left eye swollen shut, but no pain and very little discharge. He also said that he was subject to colds, and was having a cold at the time he first noticed the swelling in his eye. The day before coming to us, he had had considerable pain in the eye. Examination revealed the upper lid hard, red and swollen, so that it slightly overlapped the lower lid. It was impossible to evert the lid, but by having the patient look down and by the use of retractors, we were able to examine a good portion of the eye. There was a marked chemosis of both ocular and palpebral conjunctivae. There were several small ulcerated areas on the conjunctiva of the upper lid, more marked along the inner third. There was considerable lacrimation and slight mucopurulent discharge. The cornea was clear and free from ulceration. The vision was practically normal. The preauricular, as well as some cervical glands on the left side, were swollen. There were no pustules on the nose and cheek, but we were able to pick a membrane from and around the ulcerated areas on the upper lid.

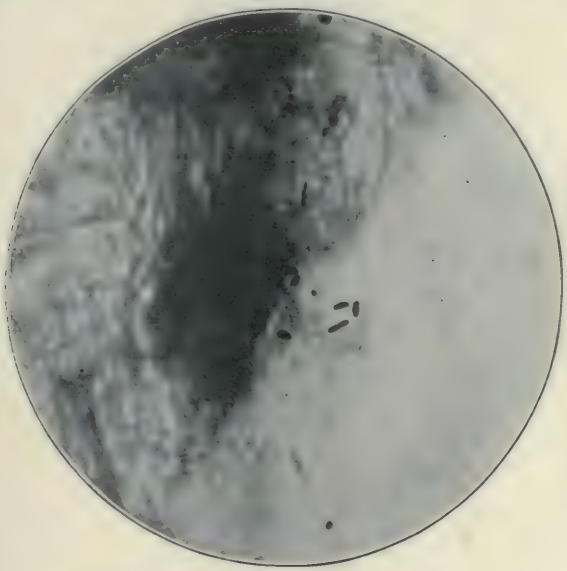

Fig. 6. (Case 3.) Smear of membrane.

We made a smear from one of the ulcerated spots, but it was negative. From a twenty-four hour growth on agar, we found practically a pure culture of a small, short diplobacillus. Not being prepared to work out the bacteriology carefully, we sent a specimen of this culture to the state laboratory and received a report that the growth showed Koch-Weeks bacillus. While the bacillus did look like the Koch-Weeks, still the fact that it grew so readily on agar made us doubt its identity. The only treatment we used was occasional applications of 4 per cent. silver nitrat to the accessible ulcerated areas and cold applications, while the patient used a 20 per cent. solution of argyrol. After about five weeks, the swelling all disappeared and the eye looked quite normal."

The case which most resembles ours was reported by Dr. L. Robert Forgrave of St. Joseph, Mo., and concerned a farmer, aged 22. "The upper lid of the right eye was hard and very much swollen. There was a serous discharge which appeared slightly purulent, which later proved to be pieces of membrane. There was a distinct false membrane with pustules along the margins of both lids, extending onto the skin as far as the brow above and for probably an inch below. Those below were grouped more particularly around the external canthus. There was a decided swelling of the preauricular glands. This man gave a history of being struck in the eye with a small piece of weed. The microscopic findings were remarkable for the few germs shown, only a few staphylococci and occasional streptococci were found. I had scrapings from the pustules taken and the secretions of the eye reexamined with the same results. I did not notice the unilateral characteristics of this case, as I isolated the left eye, but it is possible there would have been no extension had I not done so. I treated this man with ice packs, permanganat irrigations, and argyrol instillations. He made a nice recovery with no unfavorable results, except the loss of the cilia on all of the upper and most of the lower lids, and some scarring of the lid margins. He was dismissed from the hospital after eighteen days."

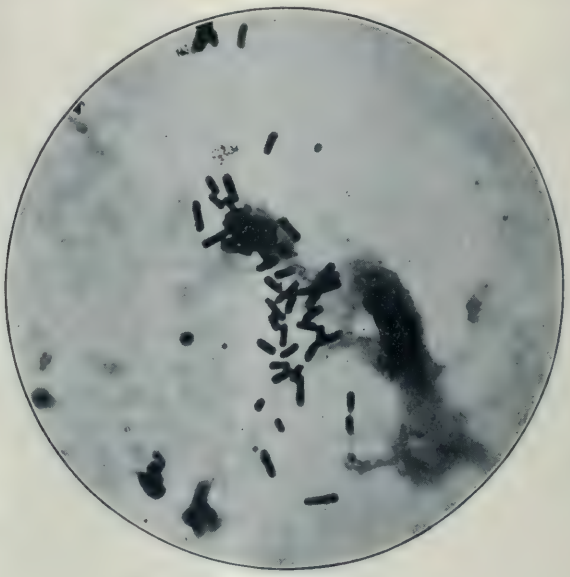

Fig. 7. (Case 4.) Smear of pustule.

BACTERIOLOGIC SUMMARY.

[The details of the laboratory findings have been published in the Transactions of the Section on Ophthalmology of the A. M. A., 1921, page 234.]

All cases showed staphylococci, usually in both membrane and pustules, and usually in smears as well as cultures. In five, this was *S. aureus;* in one, *S. albus.* Of three strains tested by animal inoculation, one proved markedly pathogenic, one slightly pathogenic, the other not at all. Two showed streptococci in large numbers. All showed slender gram-positive bacilli in moderate numbers in either membrane or pustule, which resembled *B. xerosis,* tho only one strain was tested for pathogenicity. The bacilli never showed the typical polar staining of *B. diphtheriae,* but a predominance of clubbed and barred forms in culture, and in the absence of any other evidences of diphtheria or history of exposure to it, their identifica-

tion as *B. xerosis* seemed the most probable one.

One showed the organism called *Bacillus A 1*, which produced a moderate conjunctivitis in one animal.

Bacilli resembling the large gram-positive spore bearer, found in such profusion in Cases 4 and 5, were found in the smears of all cases except Case 1. In Cases 3 and 6, only a few such organisms were found in smear, and were thought to be staphylococcic infections of the skin due to the excoriation and pressure from the original condition, tho Dr. Harold Gifford from the first emphasized them as a distinct feature of the cases.

While such complex bacteriologic findings, not complete in all details, make any definite conclusion as to etiology impossible, we believe that *B. diphtheriae* can be ruled out; and since

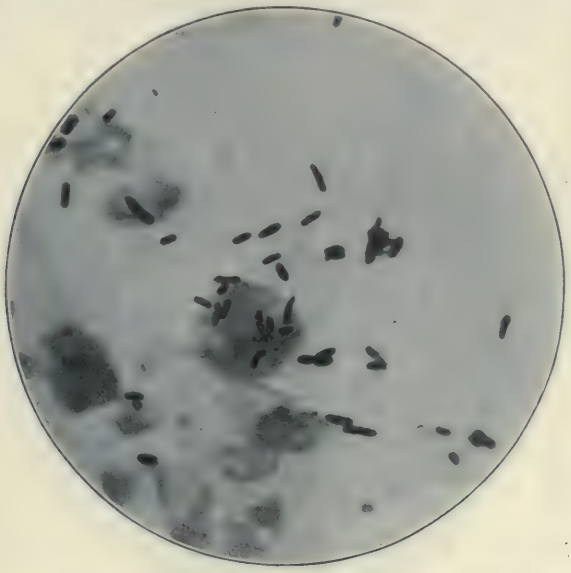

Fig. 8. (Case 5). Smear of conjunctival secretion.

may possibly have been atypical xerosis bacilli. In Case 2, however, their arrangement in chains made a distinction certain, while in Case 6, a culture was obtained similar to that in Case 5. A pure culture was obtained anaerobically in two cases. One of these strains produced a severe conjunctivitis in one guinea-pig, negative results in others. The other gave negative results in a limited number of animals. A rather meager investigation of these two strains with the serum of three cases gave negative results. Anaerobic cultures were made only in the last three cases.

Case 1 was rather summarily investigated. It is also to be regretted that at first the importance of the skin lesion did not sufficiently impress us, so that no investigation of their contents was made in Cases 2 and 3. They the cases with streptococci were not essentially different from the others, we believe these cannot have been the primary agent. The staphylococci, for reasons given before, we are inclined to consider as secondary occupants of the field. They were not found as the predominant organism in the smears.

In the case of the large gram-positive bacillus, however, record of its presence in five out of six cases seems more important, since any similar organisms are among the rarest findings in the conjunctival sac or on the lid borders. Tho animal inoculations gave no conclusive results, it is well known that animals differ in their susceptibility to organisms pathogenic for man. The serologic tests, tho negative, were not at all comprehensive. Hence, tho it cannot be concluded that it was the

etiologic factor, its presence in these cases seems the most interesting point in our laboratory findings. The possibility of its spores, living and viable at outdoor temperatures, having got into the eyes from vegetation or dirt and having germinated there, seems not so very unlikely.

REVIEW OF THE LITERATURE

In searching for cases similar to those we have observed, it is difficult to be sure that all reports which may have concerned such cases have been examined. Taking the four most striking features which have marked our cases, enormous swelling of the lids, swelling of the lymph nodes, ulcers of the skin of the lids, and membrane on the conjunctiva, we have sought out available reports on membranous, pseudomembranous or diphtheritic conjunctivitis, gangrene of the lids, and some of the reports of Parinaud's conjunctivitis.

Coppez[1] in an exhaustive monograph, considers most of the reported cases of membranous conjunctivitis up to 1897. He includes all types with membrane formation, and from his work, the deduction seems unavoidable that no sharp distinction, either clinical or etiologic, can be drawn between the mild or superficial and the deep or interstitial forms. All gradations are observed between them, and while *B. diphtheriae* is the commonest cause, various organisms may cause either type. He quotes several cases to show that *B. diphtheriae* may cause a simple catarrhal conjunctivitis without membrane formation, while even these catarrhal cases may present all the toxic complications of the deep form, paralysis, and even death. Sourdille[2] was able to produce all of these stages in animals by graded applications of chemical agents as well as by *B. diphtheriae*. If we accept this, we escape the confusion in terminology between membranous and pseudomembranous conjunctivitis which has befogged our conceptions of this disease.

Fig. 9 (Case 5).—Culture on anaerobic serum slants.

In relation to the present cases, Coppez' description of the deep form, most often due to *B. diphtheriae*, tho sometimes to other organisms, is worth repeating. After a period of from one to two days, in which only a peculiar shiny appearance of the conjunctiva is noted, the period of fibrinous infiltration sets in. The upper lid becomes tensely swollen, dark with congestion, and so hard as not to be everted without an anesthetic. The membrane covering the palpebral and often the bulbar conjunctiva is thick, and detachable only in shreds,

leaving a pale subconjunctival tissue which does not bleed. The skin of the lids and sometimes of the forehead, cheeks and nose presents ulcers covered with grayish exudate. The ciliary border is ulcerated and bleeding. The preauricular and cervical glands may be enlarged. This is followed by a period of suppuration, when the lids become soft, and then by one of cicatrization, in which granulations like those in trachoma appear and may last for months, before the conjunctiva becomes smooth and scarred. Of his own fifteen cases, all but four showed skin lesions, tho in several of these, they may have been due to preexisting eczema or impetigo. All were due to *B. diphtheriae* except two, probably due to streptococci. While the clinical picture resembles very closely our cases, it must be noted that all of his cases were in children, the oldest being 6 years old, and most infants under 2 years. Moreover, all but two were binocular, while in two others a catarrhal conjunctivitis only occurred in the second eye. He illustrates from the literature the occasional occurrence of a membrane in gonorrheal, Koch-Weeks, and pneumococcic conjunctivitis, but none of these cases showed skin lesions. Of the sixteen cases quoted which were due to streptococcus, only his own two cases apparently showed skin lesions. In the first, a boy 3 years, an ulceration at one internal angle spread all over the lower lid. Both corneas were lost. In the second, a girl of 9 months, ulcers appeared on both left lids, the right eye showing only catarrhal conjunctivitis. Both children died of pneumonia, and both strains of streptococci proved very virulent for animals. The cases apparently due to staphylococci were milder, but one of Pichler's cases, a girl of 2, showed eczematous lesions of the face, and the girl of 6 months, whose case was reported by Van der Straeten, had a severe type with perforation of the cornea, and showed also impetiginous lesions of the face. In both of these, however, the skin lesions were probably preexisting.

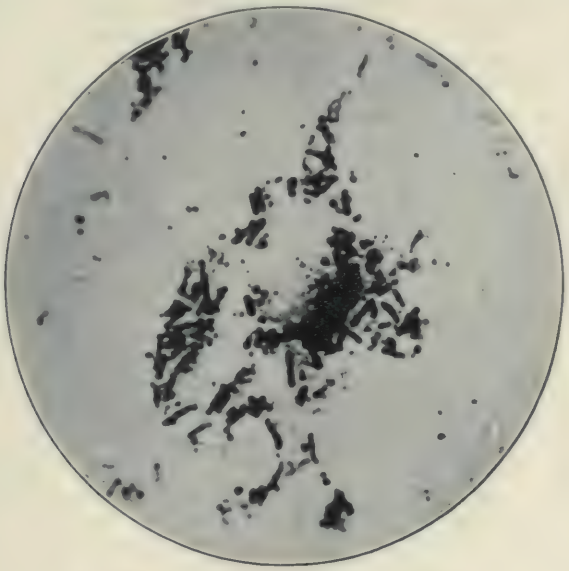

Fig. 10. (Case 6.) Anaerobic culture.

Of the textbooks, Axenfeld[3] describes necrotic areas on the skin of the lids covered by membrane, as of frequent occurrence, and mentions cases in which a whole lid has become gangrenous.

Ball[4] states that any areas of skin over which the secretion accumulates may become abraded and covered by membrane. Harman,[5] considering seven cases of the deep form in his observation, describes "the marked ex-

coriation and necrosis of the skin, to so severe an extent in one case as to present the clinical picture of noma." He gives illustrations of this case and one other with patches of membrane on both lids. (These, with Axenfeld's, are the only illustrations we have seen showing the skin lesions.) His cases were all in very young children, and all but one were monocular, in which last point his experience differs from that of most observers. All were due to *B. diphtheriae,* except one severe case in a 2 year old child, with marked skin lesions, due to *Streptococcus brevis.* De Wecker[6] states that it often extends to the skin of the lids, occasionally even producing symblepharon. Von Graefe[7] mentions the extension of the membrane to the skin near the lid borders, forming discrete plaques.

Meyerhof[8] describes two cases of the very severe, deep form, due to streptococci; and in both of these impetiginous or herpetic lesions were present on the skin of the lids. Both were children under 6. He describes another case in a girl of 3, in which streptococcus, Koch-Weeks bacillus, pneumococcus, and staphylococcus were present, with similar skin lesions. All three cases presented swelling of the glands. In his case due to *B. diphtheriae,* he has often seen the membrane extend into the skin of the lids, and states that symblepharon may occur.

The eczematous conditions of the lids mentioned as common by Schmidt-Rimpler[9] and described as an occasional accompaniment of the condition by others, is probably of a different nature, simply the scrofulous lesions often seen in undernourished children.

Of Jessop's[10] thirteen cases, one girl of 2 1/2 years showed a tremendous boardlike swelling of the right lids, with membrane extending onto the skin of both lids. This disease remained monocular, and the cornea was spared. *S. aureus* alone was found, but antitoxin was given. In Manz[11] case, that of a girl of 3, swelling of the lids was so great that a canthotomy was performed, the wound becoming covered with membrane.

Hudson and Panton[12] describe a monocular case in a boy of 16 with infection of the skin of the lid borders and swelling of the glands. The membrane was superficial and the disease ran its course in one week. *S. aureus* only was found. A second case, a girl of 13, showed many flattened vesicles along both lid margins. *Staphylococcus albus* was the only organism found. In still another case, a boy of 2, in which both *B. diphtheriae* and streptococcus were found, a pustule developed on the cheek below the eye, which gave only the streptococcus on culture. They mention also two other cases due to *S. aureus,* one to *S. citreus,* two to *S. albus,* and one with *S. aureus* and Koch-Weeks bacillus, as all showing membrane and superficial necrosis of the skin near the lid borders. Most of these were in young children, and all but one were of the superficial type.

From a purely bacteriologic point of view, the reports indicate that besides *B. diphtheriae,* the streptococcus especially may produce severe membranous conjunctivitis, and that more exceptionally the gonococcus, Koch-Weeks bacillus, and pneumococcus may do so. Such competent observers as Coppez, Hudson and Panton and others believe that *S. aureus* and even *S. albus* may also be incriminated. In spite of this, and in spite of having seen cases of severe conjunctivitis in which no other organism could be found, we are inclined to question whether these organisms, almost universally present on normal lid borders, and so often seen as the cause of severe styes or lid abscesses with only a moderate conjunctival hyperemia resulting, can act as the primary invader of an intact conjunctiva to produce such a clinical picture. It seems more likely that the primary organism has escaped observation in these cases, the staphylococci being secondary occupants of the field.

For their bacteriologic interest, there may here be mentioned a few cases of membranous conjunctivitis apparently due to more unusual organisms. Such are the cases of Attias[13] due to a pathogenic *B. subtilis* and Gehrke and Kain,[14] who found a gram-negative bacillus which produced membranous conjunctivitis in rabbits. Barriére[15] and Verderame (quoted by Barriére) found *B. pyocyaneus,* which proved pathogenic,

tho not producing a membrane in animals. The meningococcus has occasionally been found, as by Anarygros and Moisonnier, quoted by Guglianetti.[16]

Many cases have shown mixed infections, like our cases, and Sourdille[17] has emphasized the importance of the secondary organisms. He believes the cases in which the staphylococcus is associated with *B. diphtheriae* are usually of the superficial type, those with streptococcus and *B. diphtheriae* usually of the deep type, with corneal involvement. Howe[18] also emphasizes the importance of the diplostreptococcus which he found with *B. diphtheriae* in his chronic cases.

Gangrene of the lids, of a type deeper than in most of the previous cases, has been reported as a complication of diphtheritic conjunctivitis. Both Axenfeld and Harman mention it, as stated above. Schillinger's[19] case, in a 14 day old infant, was considered diphtheritic, tho the organisms were identified by smear only. Vix'[20] case of spontaneous symmetric gangrene of the lids and of the skin around both tear sacs in an infant, was also thought to be probably diphtheritic, tho bacteriologic findings were negative. Steffens (quoted by Pes) obtained *B. diphtheriae*, staphylococcus and streptococcus in a diphtheritic gangrenous process of the lids without any conjunctival involvement. The case was that of a child, aged 6 weeks. Randall[21] observed severe spontaneous gangrene of the lids in three healthy children of a family, aged 1, 3, and 5, but no conjunctival membrane is mentioned, and tho *B. diphtheriae* was found in one case, there were no other evidences of diphtheria, or any exposure to it, so its significance was questioned. Derby[22] mentions these cases and that of Mori and Yamamoto. Other cases of gangrene of the lids have shown less resemblance to the present cases. Those due to anthrax and those occurring in erysipelas show little in common with them, nor do the cases occurring as a complication of measles, chickenpox, and whooping cough in rundown children.

One case of Morax'[23] is interesting as it occurred in a man of 44, two weeks after he had pricked his lid on a piece of straw. He suffered with fever and chills and enormous swelling of the right lids and cheek, with a row of herpetic vesicles on the lid borders. The phlegmon broke, forming six discharging ulcers, which healed in a few days. A virulent streptococcus was found. No membrane of the conjunctiva was mentioned, but the lids could not be opened for observation till the swelling had gone down, as in our Case 4.

Possek's[24] case had no membrane but is worth mentioning, as it occurred in one eye of a girl, aged 28, with nothing but a bad cold preceding it. Swelling of the lids was extreme, so that the conjunctiva could not be seen. Lymphatic involvement extended to the axillary nodes. On incision, no pus escaped, only a whitish lardaceous material, apparently much like that seen in our cases. Repeated cultures gave only *S. aureus*. He reports a similar case in a man, aged 32, also occurring without trauma, after a cold and fever. There was a slough of the superficial layers of one lid. No membrane is mentioned.

One case reported by Pes[25] seems to resemble some of our cases more closely than any of the cases mentioned. It occurred in a peasant woman, aged 48, who was scratched on both of the lids and on the globe by a hen's claw. Rapid swelling of the lids ensued, necrotic ulcers developing on the skin, with sinuses extending deep into the tissues. A thick pseudomembrane covered the ocular conjunctiva, the cornea became necrotic and panophthalmitis developed. Adhesions were left between the lids and globe. Staphylococci and streptococci were found in the smears. *S. aureus* was found only in cultures, the strain proving pathogenic for animals. His other cases were of severe gangrene of the lids in adult males, secondary to trauma, but no conjunctival membrane is mentioned. Photographs illustrate the lid conditions.

For the sake of completeness, one other type of case with skin lesions associated with membranous conjunctivitis may be mentioned. This is herpes iris, as described by Fuchs[26] and Hanke.[27] Various organisms have been found in the membrane; streptococci, staphylococci, and even one of

the *B. coli* group; but these are probably secondary, and the etiology of the skin lesion is not known. The diagnosis should be clear from the peculiar skin lesions elsewhere on the body, tho Hanke maintains that it may affect the conjunctiva alone.

Parinaud's conjunctivitis presents features which should serve to differentiate it easily from these cases. In it the conjunctival ulcers are typically discrete, without any diffuse membrane formation, the characteristic granulations are present, and skin lesions do not occur.

TREATMENT

In the diphtheritic cases, all now believe that antitoxin, as first used by Coppez, is the most important therapeutic agent.

Local treatment should consist chiefly in hot rather than cold compresses, and frequent irrigations with mild antiseptic solutions. During the stage of extreme swelling, the oculist is almost helpless, and perforations of the cornea often occur under careful treatment in the best hands, especially in the streptococcus cases. The emphatic advice of Coppez and de Wecker to avoid all unnecessary handling, and especially to avoid the use of solid caustics or strong silver nitrat solutions in this stage seems justified. If a later purulent stage appears, silver nitrat may be useful. It seems best, as Coppez states, never to try to remove the membrane, except small pieces for examination. He even advised against the trauma of frequent copious irrigations, and uses petrolatum with a small amount of iodoform or aristol on the lid borders and in the sac, removing only the fluid secretion with cotton several times a day, when the petrolatum is freshly applied.

Lemon juice has a traditional popularity in conjunctivitis with a membrane (Guibert[28]). Vian[29] reports success with applications of crude oil to the membrane.

The use of antistreptococcic serum might seem indicated in cases of clear streptococcic origin, but in the presence of such complex bacteriologic findings as our cases showed hardly seemed justifiable. (In the one case in which the smears showed numerous cocci resembling pneumococci, polyvalent antipneumococcus serum showed no evident favorable influence.)

SUMMARY OF LITERATURE

Severe cases of membranous conjunctivitis due to *B. diphtheriae* show a great resemblance to our cases, often presenting their four main features. They nearly always occur, however, in young children, are usually bilateral and usually show involvement of other mucous membranes or a history of exposure to diphtheria. In these severe cases, the frequent corneal involvement has been of a deep character, usually with perforation or sloughing of the entire cornea in the absence of specific treatment. They have usually occurred in city dwellers, without a history of trauma.

The streptococcic cases may also show a great similarity, but skin lesions have been rarely reported, and these cases (Coppez, Harman) were in young children.

Some of the cases attributed to staphylococcus present many features in common. One of Hudson and Panton's cases, in a boy of 16, showed the membrane, skin lesions and swollen glands, and was severe only in one eye. Three of their other cases, two in girls of 7 and the other in a girl, aged 1 year, were somewhat similar, but with a more superficial membrane and milder course. Jessop's case was similar and was monocular, but was in a girl, aged 2 1/2 years.

In the cases of membranous conjunctivitis due to other organisms, skin lesions have apparently not been described.

Both of Morax' and Possek's cases of lid gangrene were monocular and occurred in adults, Morax' case evidently being that of a farmer with a history of trauma, but in them no conjunctival membrane was described.

The case showing most similarity to our cases was that of Pes, being monocular, in an adult peasant woman, and being accompanied by membrane on the ocular conjunctiva. Here the

simultaneous trauma to the lids and globe with accompanying infection was doubtless responsible.

CONCLUSIONS

1. Six cases were seen, all but two of which presented the common features of enormous swelling of the lids, swelling of the regional lymph nodes, superficial necrosis of the skin of the lids, and membrane on the conjunctiva. The other two, tho lacking one or two of these signs, were similar enough to warrant their inclusion as atypical cases.

2. All occurred in healthy adult or adolescent males engaged in outdoor occupations.

3. Three gave a history of slight trauma to the conjunctiva or lids. None had been exposed to diphtheria or showed any signs of it on other mucous membranes.

4. Mixed infection was present in all cases, the streptococcus, staphylococcus, *B. xerosis* and a large gram-positive anaerobic bacillus being found. The last was probably present in five of the six cases, and on account of the rarity of similar findings on normal lids or conjunctiva, is considered as possibly having an etiologic relation to the cases.

5. The cases seemed to form a distinct enough clinical picture to warrant their inclusion in a group for which the name "agricultural conjunctivitis" is suggested.

We wish to express our warmest appreciation to our chief, Dr. Harold Gifford, who saw most of the cases with us, and urged us to report them. Also to Dr. John T. Meyers and Dr. E. G. Cary, who went over some of the bacteriologic material with us.

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BILATERAL BLOOD STAINING OF THE CORNEA.

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This is the detailed report of a case in which the blood staining of the cornea was bilateral, and followed iridectomy for multiple adhesions of the iris to the lens. Read before the Eye and Ear Section of the Illinois State Medical Society, May 17, 1922.

Blood staining of the cornea has been recognized as a clinical entity for many a year, altho it has been only within the last decade that the nature of the staining elements has been identified. A fair share of the cases of this disease eventually clear, thus obviating the possibility of staining experiments and, as it is impossible to determine a priori which cases will clear, comparatively few are available for chemical analysis of the staining elements during the early stages. The case here reported is of interest from another standpoint, and as far as a search of the literature reveals, it is unique. The findings will be described in somewhat more detail than a mere case report would warrant because of the unusual condition.

August 20, 1919, M. G., female, aged 35. About 6 months ago, inflammation of the right eye followed shortly by similar inflammation of the left. No treatment. Condition gradually subsided and recurred frequently. No etiologic factor known. Gradual decrease in vision. Status Praesens—R. Faint ciliary injection. Multiple posterior precipitates on the cornea. Anterior chamber shallow. Iris somewhat atrophic and pupillary edge very serrated by multiple dense posterior adhesions, which almost entirely prevent dilatation of the pupil. Some exudate on and opacity of anterior lens capsule. Vitreous hazy, but no formed floaters. Fundus is seen hazily, but seems normal. Vision, 0.1. Tension normal.

L. Eye pale. No posterior precipitates. Iris atrophic, but not as markedly so as in the right. Pupillary edge is free only in upper quadrant and bound down elsewhere by multiple posterior adhesions. Anterior capsule clearer than right. Vitreous hazy. Fundus is hazy, but seems normal. Vision, 0.6. Tension normal.

A search for etiologic factors of the old iritis revealed no general pathology beyond a chronic constipation. The usual local treatment of atropin, dionin, and heat was ordered, and K. I. was given internally. The condition of both eyes continued for about a year with alternate subacute exacerbations of the iritis and remissions, complicated by intermittent increase in the intraocular tension. The vision continued to decrease slowly.

Operation.—July 8, 1920.—Bilateral keratome iridectomy (upward). The pupillary edge of the right iris could not be freed and consequently the sphincter was left intact. Both anterior chambers filled with blood which was immediately renewed upon removal.

July 11, 1920. R. Moderately injected. Wound well closed. Anterior chamber full of blood. L. Some edema of lid. One corner of wound blocked with a tag of iris tissue. Tension increased.

July 14, 1920. Both eyes becoming paler. Both corneae show a good window reflex, but are dull reddish brown in color and are completely opaque. Ordered dionin, heat, K. I. internally, and sweats.

July 19, 1920. No change in condition. Started subcutaneous injection of 8 mg. of fibrolysin every other day.

July 27, 1920. Color of right cornea has changed from a deep red brown to a green brown.

July 30, 1920. Color of left cornea now changed to green brown.

August 6, 1920. Beginning clearing of right cornea in extreme periphery.

Sept. 3, 1920. Clearing of right cornea advancing rapidly. Tension normal. Left eye pale, but flushes

easily. Beginning of clearing of cornea in extreme periphery. Tension minus.

Sept. 25, 1920. Nasal half of right cornea has cleared sufficiently so that iris is barely visible. Temporal half still greenish and opaque. Anterior chamber normal. Iris details not clearly visible. Pupil is filled with membrane and is drawn upward. Complete opacity of lens. The left cornea is somewhat flattened. The absorption of the greenish opacity is very slow and the cornea is becoming vascularized. A minute tag of iris is still incarcerated in the angle of the wound. The iris details are not visible. There seems to be a complete opacity of the lens. Tension minus.

Jan. 27, 1921. The right cornea is normal except for a slight area of opacity in the inferior temporal quadrant. Discission of the right lens was performed, very cautiously for fear of further hemorrhage.

The left eye is unchanged from the last record.

Feb. 25, 1921. Extensive needling of the right lens. There was not a great deal of reaction to this operation, and altho there was a slight hemorrhage into the anterior chamber, the blood was promptly absorbed.

June 21, 1921. No change in the external condition of the right or left eye. An unsuccessful endeavor was made to perform a central iridotomy with a Ziegler knife.

July 7, 1921. A broad keratome incision was made in the right cornea and an *irito-ektomie* of the Elschnig type was attempted. Altho no iris tissue was removed, the pupillary edge of the coloboma was freed and a large opening was made thru the membrane that filled the coloboma. Behind this was an irregular mass of lens cortex and capsule.

August 3, 1921. The membrane reformed, contracting the iris down and completely closing the coloboma so that the lens is not visible. The clearing of the left cornea has ceased, despite all forms of local treatment, and organization of the infiltrated cornea is becoming apparent. With a Graefe knife, a 1/3 incision was made thru the right cornea and with the tip of the knife, a puncture and counterpuncture thru the iris was made. On finishing the cut, a fair sized coloboma was produced. Thru this considerable lens cortex was removed with a Jaeger spoon. About three beads of vitreous escaped. The eye recovered from this extensive operation readily and with but little irritation.

Dec. 7, 1921. The right eye was pale. The cornea showed several peripheric areas of scar, corresponding to the extensive operative wounds. In the coloboma were some capsular remains that covered the optical axis. These were severed by a simple needling.

April 1, 1922. Right eye pale. The cornea is slightly flattened and shrunken and shows numerous peripheric scars that are the result of the various operative procedures, but there is no opacity due to the blood staining in evidence, nor can any be discovered with the slit lamp. However, the lymph system of the cornea is very irregular with marked enlargement of the lymph channels. The anterior chamber is moderately deep in the center but is shallow in the upper and outer periphery, where the iris lies near to the posterior surface of the cornea. The iris is irregularly atrophic and shows much scar tissue on its surface. There is a coloboma upward that is closed with a membrane. In the center, corresponding to the pupillary area, is a coloboma of irregular outline, which lies below the former margin of the pupil, the latter having been displaced upward. Thru this coloboma, a clear view of the fundus can be obtained. The vitreous is slightly hazy, but the retina and nerve head present no pathology. The tension of the eye is normal. + 11.00 sp. ⌒ + 3.00 cyl. ax. 40 = vision of 0.6, and with reading correction added, Jaeger 2.

The left eye is pale. The cornea is flattened, and at the upper inner edge of the former iridectomy wound is a small black subconjunctival area of former iris prolapse. The cornea is diffusely opaque, and with the slit lamp

the opacity is seen to be within the corneal stroma, but evidently not involving the anterior or posterior membranes. The individual areas of opacity are not sharply outlined, but merge into one another, with partially clear areas of corneal tissues between. The opacity is greyish white in color. There is a considerable vascularization by deep scleral vessels, four main trunks entering the cornea. There is not much ramification of the vessels. Corneal nerves can be seen at times and these appear to be thickened. The anterior chamber is shallow. Iris details cannot be seen, but the pupil appears to be dilated with a regular coloboma upward. The lens is entirely opaque. The tension is normal and the vision is light perception with good projection.

According to Maghy[9], blood staining of the cornea was first described by Baumgarten[1] in 1883, whereas in reality the first description of the condition emanated from Schmidt-Rimpler[14] in 1875, and was called by him "Apoplexy of the Cornea." The present name was given the condition by Hirschberg[8] in 1896. In all, some 43 cases have been described by the various authors, about half of them accompanied by an anatomic study of the cornea. Undoubtedly many more cases have been observed, but have not made their appearance in the literature.

Up to 1913, Kusama[11] was able to collect the reports of 21 cases, to which have been added since cases by the following authors: Wells[17]; Buchanan[3], 5 cases; Fisher[6]; Begle[2], 4 cases; Maghy[9], 3 cases; Wernicke[18]; Matsuoka[10], 2 cases; Pissarello[12], 3 cases; Elschnig[5]. In practically all of the cases studied anatomically, there was unanimity regarding the presence within the cornea of the highly refractile oval bodies so characteristic of this condition, which were first described by Treacher Collins[4] and shortly after by Vossius[15] and somewhat later by Roemer.[13] These authors all agreed that the bodies were probably derived from the blood elements that found their way into the cornea, but careful inquiry into the chemical nature of the bodies was not possible.

In 1914, Begle[2] made a spectroscopic analysis of a blood stained cornea and established the fact that "In this condition, a solution of hemoglobin is imbibed by the cornea. To the presence of this hemoglobin solution the greenish or brownish discoloration of the cornea must be ascribed." But his method of analysis failed to reveal the chemical nature of the intracorneal refractile bodies and led him merely to the suggestion that "they are elementary noniron containing split product of hemoglobin, despite the fact that positive reaction for a number of the end products of protein disintegration were not obtained."

Simultaneously there appeared an article from the Tokio Clinic by the Japanese Regimental Surgeon Kusama[11], whose investigations led him to the following conclusions: "It is very probable that the blood in the anterior chamber loses its normal characteristics, (this is the theory advanced by Gutmann[7]) and that the hemoglobin which has diffused out of the red blood cells, forces its way into the parenchyma of the cornea by diffusion. From the hemosiderin thus carried into the cornea, which eventually loses its iron, the peculiar refractile bodies arise. From their characteristics, these belong to the group called by Unna[15] "Melanosiderin." Maghy[9] agrees with this view in the main.

In many of the cases described clinically, the entire cornea was not involved in the staining process, while in those in which the entire cornea became opaque, it was very noticeable that there was a fairly clear band of normal corneal tissue at the limbus. This is ascribed by Maghy to the better lymph circulation of the cornea in this area. The staining usually followed perforating or blunt injury of the eyeball; but in some cases was subsequent to an iridocyclitis, particularly of a persistent and chronic type. The condition appeared in from three days to three months after the exciting factor set in, and was almost always dependent upon the presence of more or less blood in the anterior

chamber. In some cases, the chamber was full of blood, whereas in others, there was but two or three millimeters of hyphema. A few cases of entire clearing of the stained cornea have been reported; but in the majority the condition persisted or complications arose that necessitated removal of the eyeball. The lens became cataractous in some of the cases, while in others the nutrition of the lens did not appear to be disturbed.

The case here reported presents the following unusual features: (1) Both corneas became stained with blood at the same time, subsequent to bilateral iridectomy. This procedure admits of discussion. Many prominent ophthalmologists believe in and practice operation upon both eyes at the same time, while others condemn such practice. Many factors, the discussion of which is not pertinent here, must needs be taken into consideration, not the least among which is the economic situation of the patient. As far as a search of the literature shows, this is the only bilateral case on record.

(2) The blood staining appeared on the sixth day after the iridectomy, during which time the chambers were full of blood. The diagnosis was made tentatively on the fifth day, but was not definite until the sixth. This time element coincides with that found in the majority of the case reports.

(3) The intraocular tension, subsequent to operation, was at no time increased in the right eye, and eventually this cornea became perfectly clear.

(4) The intraocular tension in the left eye became increased immediately subsequent to the operation and in this eye the cornea did not clear. In this eye there was a small iris prolapse in one corner of the wound; and whether this was incidental to or causative of the increased tension and subsequent opacity of the cornea, or whether there was some underlying predisposition of that eye toward the unfortunate outcome cannot be told. What is the relation between intraocular tension increased subsequent to the hemorrhage and failure of the cornea to clear?

(5) In both eyes, the opacity of the cornea extended completely to the limbus and involved every particle of transparent cornea. In this fact, this case varies from all heretofore reported.

(6) The right cornea cleared completely, while the left remained slightly more than translucent. Both eyes appeared the same in the beginning, with the single exception of the small iris prolapse in the left, and both were subjected to the same treatment. Incidently, it is very questionable whether treatment had any influence upon the clearing process at all. That difference in regeneration is beyond the possibility of explanation.

(7) The right eye was subjected to six more or less violent operative procedures, involving at different times considerable hemorrhage into the anterior chamber without any further staining of the cornea. Did a localized immunity to the split products of hemoglobin, either with or without iron, come into being? Or did Descemet's membrane develop a closer mesh, that prevented the diffusion of hemoglobin into the cornea; or did the blood that appeared during the later operations in the anterior chamber retain the hemoglobin within the red blood cells, or did the blood in the anterior chamber absorb so rapidly that there was not sufficient time for the diffusion of the hemoglobin into the aqueous and subsequent diffusion into the cornea?

(8) The lenses in both eyes became completely opaque. This was probably due to the nutritive disturbance induced by the inflammatory reaction of the anterior uvea and the consequent exudate.

(9) The remarkable connective tissue forming capabilities of the right iris were evidently a manifestation of the toxic irritability of the tissue.

(10) The ultimate corrected vision of the right eye is better than the vision of that eye was before the hemorrhage and blood staining occurred.

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THIRD NERVE REFLEXES.

J. P. Williams, M.D.

LINCOLN, NEBRASKA

Ophthalmic migrain or scintillating scotoma, disturbance of heart action, profound vertigo and disturbed sleep are here grouped as reflexes. The most important cause is exposure to bright light which disturbs the pupil reflex. Accommodative strain is next and muscular imbalance a third cause. A case is cited in which hyperphoria when uncorrected caused unconsciousness. Read before the January meeting of the Omaha and Council Bluffs Ophthalmological and Oto-Laryngological Society, see p. 654.

Some years ago, when speaking of muscle imbalances with an oculist of wide experience, he made the remark to me that he believed that if we could uncover and correct the latent hyperphorias, the lateral muscles would largely take care of themselves. This was at a time when it was quite the custom, and the proper thing, to do tenotomies on the slightest excuse, some reporting as high as twenty or thirty operations on a single individual for lateral imbalance.

In a recent conversation with a colleague of ability and experience, he remarked that he rarely corrected muscle errors mechanically or surgically, and I inferred from his remarks that he made but little effort to uncover latent muscle errors with a view to relieving the symptoms that I shall detail presently. Somewhere between the two extremes there is a proper mean. It is quite easy for any of us to fall into the habit of becoming extreme in any of our routine examinations, and I readily recognize this weakness in myself and I shall gladly accept criticism if my conclusions seem extreme.

TYPES OF REFLEXES.

The class of cases that I wish to attribute to third nerve reflexes are not well defined in our text books. Under what is known as brief scintillating amaurosis, we have one manifestation. Zigzag flickering dark lines appear to pass before the eyes, with more or less complete obliteration of the visual field. The attack lasts usually ten to fifteen minutes, followed by a headache, often severe, and associated frequently with aphasia, marked disturbances of memory and speech. There is often a distinct aura such as tingling of the fingers, or feet, prickling sensation of the chest, numb feeling of the face.

In a second type the flickering blindness is entirely absent, in fact it is in the first type alone that there are any distinct ocular manifestations, and for this reason the second and the third types are more easily overlooked or misinterpreted. The patient feels ill,

weak in the knees, with frequently a sense of fear or apprehension, that he or she is about to faint. There may be a prickling sensation as tho grasping an electric wire, and in one case under observation, a stiffening of the hands and arms with rotating motion. These symptoms are sometimes associated with serious indigestion, distressing eructations of gas, and cardiac manifestations, intermittent, rapid pulse, the patient actually fearful of impending death.

The third type is one marked by profound vertigo, easily and frequently confused with labyrinthin disturbance, because of its sudden onset and violence. Apart from the fact that these patients do not usually respond to tests for labyrinthin effusions, it will be found that the vertigo is almost always relieved by lying down, closing the eyes, and above all excluding the light. While with labyrinthin disturbances, the vertigo is often intensified by the recumbent position, due to gravity particularly, and by variations in barometric pressure. I have found a barometer a most interesting and helpful office instrument in differentiating labyrinthin from ocular disturbances. The onset of the vertigo may be as sudden as when due to an effusion, and associated with vomiting in patients who have shown previous gastric symptoms. More often, the nausea is entirely absent.

The fourth type has to do with the subconscious manifestations and is often associated with night terrors. The attacks come on usually in the early hours of the night, shortly after the patient has gone to sleep. Such an one is awakened with a great sense of apprehension, pulse running up to 130, cold perspiration, prickling and numb sensation in any or many parts of the body, slowly regaining the normal state with great difficulty.

A psychologist friend, a keen observer and also a great sufferer from the first type, found that a study of dreams that he was carrying out so aggravated and increased in frequency his attacks, that he was forced to abandon his dream studies. The reflexes were being stimulated from his subconscious mind. In 1900 there was published in Science, an account of the scintillating variety, induced by light stimulation, and the psychologist who is reporting this case of himself, closes with the statement that an effort on his part to recall the scintillating figures induces a distinct sense of nausea.

These four types, which are wholly arbitrary as to division on my part, and easily overlap or merge in any group of cases, are all due, I believe, to stimulation reflexly thru some of the elements of the third nerve. The correction of all the irritations is usually necessary to give relief.

First, and by far the most important, is the correction of the light stimulant. Excessive light, particularly reflected sunlight, leads all other causes. A case illustrates this point. A teacher of a country school was a severe sufferer of type one. She boarded a mile west of the school, walking toward the sun in the morning, and again in the evening on her way home. She was almost completely relieved by moving to a house east of the school, walking west in the morning and east in the evening.

Many of these patients can easily induce an attack by concentrating for a few minutes their attention on a bright spot of light, as sunlight on a white piece of paper. Work in small offices in country towns, where the light is excessive and unbroken by nearby buildings, and above all, reflected from a white wall of a building unfortunately placed to reflect the light, is a frequent source of trouble. In one case I was unable to secure the desired results for a young lady until I induced her to change her style of hat to one that shaded her eyes, at least to a degree. The overseas cap, affording no protection to the eyes, was wholly inexcusable in an organization like our army, heralded as one seeking the highest physical welfare and efficiency of its members.

It will tax our ingenuity often to find the source of light irritation in many of these cases; and, having found it, to correct it. These patients as a

rule, are wholly oblivious of the fact that they are subjecting themselves to an unnecessary irritation, and it is only by persistent questioning that the oftentimes simple, but obscure source is uncovered. The treatment of this type is manifestly, to a large degree, a matter of hygiene.

The second source of irritation I find in the accommodative branch, closely related, of course to the pupillary. This refers particularly to the period of life when the accommodation is waning, and not so much to the refractive errors of earlier life. Indeed very many of these patients have eyes that are surprisingly near emmetropic. But a patient approaching forty years, who is already manifesting a presbyopia, is often very promptly relieved of reflex irritation, even tho manifesting no difficulty in reading so far as being able to see the print.

The third source has to do with the extrinsic muscles, and particularly the verticals. This is the type where I find the vertigo most frequent, with sudden attacks, completely prostrating the patient, from which they recover slowly with frequent remissions. Riding on the street car or being in a crowd, or at the movies, they are almost certain to suffer. Thru reflex sympathetic irritation, heart action is much disturbed, intermittent, rapid. This type rarely complains of headaches or any ocular disturbances, and is much surprised to have the eyes suspected as a cause. On examination of muscle balance, the convergence is often found low, but what is more important as I see it, is a vertical deviation all the way from a very slight amount up to a vertical diplopia of two or three degrees. On the first examination the vertical deviation may be very slight—just enough to show its drift. If these cases are followed up by placing on the patient a small vertical prism to be worn twenty-four hours and increased if more is found on subsequent tests, the latent error can be uncovered in a few days or a week's time. This error, I do not hesitate to correct, always slightly under the developed amount, by incorporating the prism with the correction for the refractive error. These corrections I give even as small as three-eighths of a degree, as I am satisfied that the results justify this procedure. In the larger amounts, the corrections are particularly gratifying.

One case will illustrate this type; the illustration could be duplicated many times. A man, 52 years of age, apparently in good health suddenly became dizzy and fell, while stooping over a lavatory. The prostration was great, with marked gastric disturbances. At the end of two weeks time the improvement was little or none, and a most grave prognosis was given by the attending physicians. The patient found on attempting to read, a little, unusual difficulty, and for this reason the eyes were first examined. A slight vertical diplopia was found and corrected, gradually increasing until the patient was wearing a total of about three and one-half degrees. Following this, he made rapid improvement in his physical condition, to apparently normal health. At the end of six months this man left the prisms off for about four hours, while clips were being cemented on for presbyopia, and fell again unconscious; and again, twelve months later, while having the clips recemented, and being without glasses for a few hours, nearly collapsed and was saved from falling by the chance aid of a friend. These are the only attacks of vertigo he has had since the correction was put on.

These cases I am convinced have not had the emphasis put upon them in our text books, that their frequency and annoyance, both to the doctor and the patient justify. Furthermore, either they are greatly on the increase in numbers, due possibly to our ever increasing complexity of living, as for example, the movies; or else my own enthusiasm leads me to attribute to the third nerve center reflexes, an increasingly large number of functional disturbances.

NOTES, CASES AND INSTRUMENTS

GLAUCOMATOUS CUPPING WITH LOW OCULAR TENSION AFTER WOOD ALCOHOL POISONING.

FRANK A. MORRISON, M.D., F.A.C.S.

INDIANAPOLIS, IND.

J. C., married, barber, age 46, came under observation November 6, 1920. The previous history was obscure. His brother-in-law, a physician, who accompanied him, stated he had been a hard drinker for several years. This was not admitted by the patient. Both agreed, however, no complaint of vision had been made until ten days before he came under observation. It was then noticed vision was becoming somewhat misty, but did not occasion alarm. Three days before, he awakened in the morning almost blind. The patient asserts he had taken about two teaspoonsful of whiskey the night before. However, his brother stated he had drunk almost a pint of home made bay rum which he used in his business. Upon inquiry I learned this bay rum was made from deodorized wood alcohol and oil of bay, with the addition of water.

At the time of the first visit he had bare light perception. Both nerve heads were intensely swollen and edematous, measuring five diopters. The usual unfavorable prognosis was given. Under sweating and iodides he shortly recovered a great part of his vision; and when he passed from observation it was 20/30, with but little swelling of the nerves. In spite of the repeated unfavorable prognosis he considered himself well and returned to work.

March 3, 1921, he again reported, saying his vision had within the last few days become very poor and was deteriorating rapidly. Both nerves now were white and apparently in an advanced state of atrophy. No cupping sufficient to excite suspicion was present, and the field and tension not taken in view of his previous history. On March 20 he was seen again, and the cupping now appearing suspicious, a more careful examination was made, showing among other conditions a tension of 60 in each eye, measured by the McLean tonometer.

He was immediately trephined in both eyes. Healing uneventful. The filtration was perfect with a large area of edema in the region of operation. The tension after complete healing never rose in either eye above thirty-five and remained at thirty, or very close to it. That the tension has never temporarily risen at times when not under observation is rendered practically certain from the fact it was taken repeatedly, at intervals of three or four days, and mornings and evenings. Notwithstanding this continual low tension, the cupping has increased until it now measures four diopters, completely undermined and vision abolished.

ANOMALOUS MOVEMENT OF BLIND EYE ON CLOSING THE OTHER.

A. W. STIRLING, M.D.

ATLANTA, GA.

Mr. K. M. S., age 37, consulted me on January 24, 1922. His left eye had been hit by an arrow when he was four years old. His right was normal, except that it took plus 0.75 D. Sph. on plus 0.75 D. Cyl. Axis 90°. V=6/4 and J. 1. The left (homatropin and cocain) showed a pure white cataract; practically all capsule, with a spot of pigment up and in near the periphery, corresponding to a small scar in the cornea. Vision is hand reflex when hand is held to the outer side.

The interesting point is that when the right eye is closed voluntarily or by being pushed down, the left at once turns in close to the nose, while the right turns out. The left does not turn in, however, when the right is merely covered by the hand. When the patient cuts the light to the right completely off by pressing his palm over it, the left remains straight, but as soon as the palm is slipped down on the cheek so as to close the right upper lid, the left eye turns in. The in-

ward motion of the left eye appears to be associated with the closing of the right and not with the exclusion of light from the right.

The writer formed his own opinion of the case, but sent the above notes to a distinguished ophthalmic surgeon whose name is known in connection with muscular anomalies by all his colleagues the world over. In his reply he says: "Your case is of much interest to me. The explanation, if I am right, is a very simple one, but your notes are well worthy of publication, and it would be very interesting to ask the readers to crack the nut. They might think of some better explanation than mine."

AN UNUSUAL TYPE OF VITREOUS OPACITY.

L. Waller Deichler, M.D.

PHILADELPHIA, PA.

Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, January 10, 1921.

"Opacities" in the vitreous body are of common occurrence and are seen almost daily in the course of routine practice, but because of the unusual type of opacity seen in this case, it seems worthy of report.

Mrs. M. H., 35 years of age, was referred to me because of poor sight in her right eye, which to her knowledge had existed for the past five years. There have been no other subjective symptoms at any time. She believed that she had good sight in each eye until five years ago, when she accidentally discovered that "everything was a blank" before this eye. The condition has persisted with no appreciable change during this period, and she has never before sought relief for it.

She is married, no children and no miscarriages. Menstrual history normal. Has always enjoyed good health until six years ago, when she was treated for a period of eighteen months for a condition diagnosed by her attending physician as "spinal rheumatism."

This was characterized by excruciating pain in the lower lumbar region, which was referred down the course of the left sciatic nerve and associated with weakness in the extremities. She was confined to bed for one year and spent an additional six months in a rolling chair. She has had recurrences at irregular intervals since, but never as severe as the primary attack, lasting a few days to a week.

She also has a vague, indistinct recollection of an inflammation of both eyes at four years of age. There was intense photophobia in this attack, and she wore a green shield for some time, but the actual inflammation lasted only about five days.

In addition, she gives the history of a fall from a bench eighteen years ago, with injury to her left side, but no apparent injury to her head or eyes.

Examination.—Vision of O. D. was 15/200 and of O. S. 15/10 —2, which was improved by refraction to 15/40 —3 or 15/50 +2 partly and 15/10.

External appearance of cornea and anterior chamber was normal in each eye. Pupils were equal and reacted promptly to light and acommodation. Ocular movements normal. Tension normal in each eye.

O. D.—Lens clear; fine vitreous haze permitting but limited view of fundus thru undilated pupil. A mydriatic was instilled, when pupil became evenly and fully dilated.

Examination then revealed the presence of a large, ring shaped opacity, situated in front of and parallel to the optic disc, just a little behind the middle of the vitreous body. This was somewhat oval in shape, with the upper margin somewhat flattened and the lower somewhat bulging, about the size and shape of a cross section of the lens, and everywhere free except for a fine convoluted strand, which connected the temporal edge of the ring with the temporal side of the globe, near to if not actually attached to the ciliary body. This strand acts as a guy-rope keeping the opacity which is freely movable in a relatively fixed position.

View thru this ring is unobstructed as is the view around it. The disc is sharply outlined and oval at 105°.

There is no demonstrable lesion of the fundus except a small, irregularly oval area of chorioretinitis, a little below and somewhat to the temporal side of the fovea. The margins of this area are well defined, within which are seen choroidal and retinal disturbance with atrophic change and pigment heaps.

Visual field for this eye gives a small absolute scotoma corresponding to this area of fundus change. (Fig. 1.)

Blood and spinal Wassermann reactions are negative and urinalysis is normal.

O. S.—Examination of this eye is negative with no demonstrable lesion.

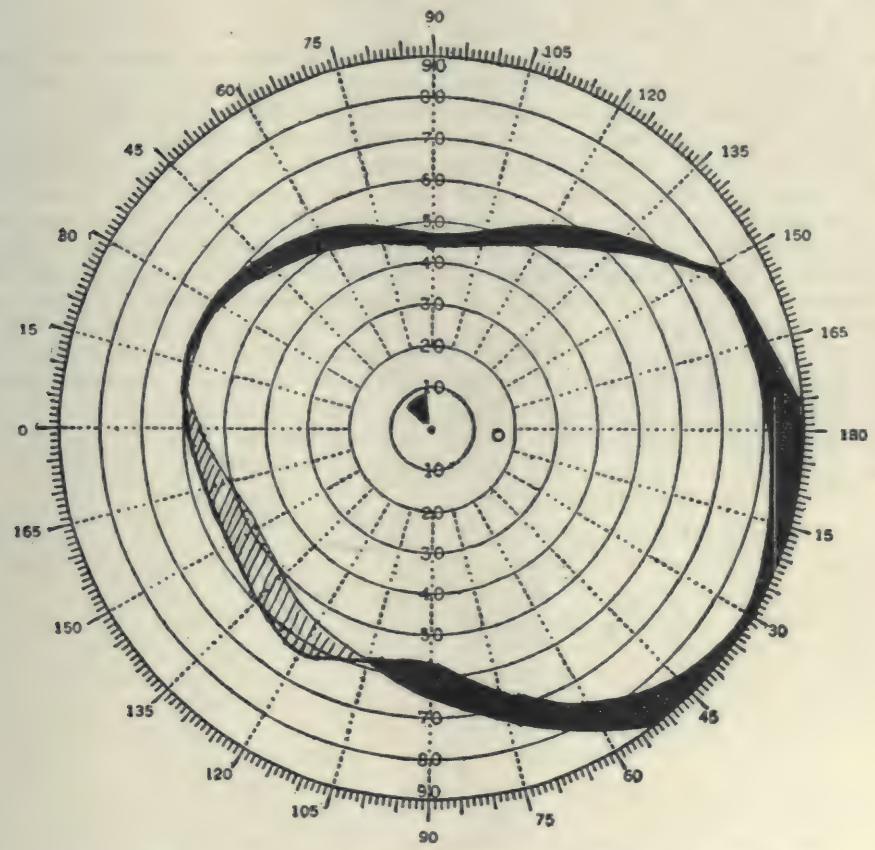

Fig. 1. Field of vision for right eye, showing small scotoma near fixation point.

TOTAL COLOBOMA OF THE IRIS.

L. W. Morsman, M.D.

HIBBING, MINN.

The term aniridia is usually applied to apparent complete absence of the iris. In such cases as have been reported in literature, where postmortem examinations have been obtained, it has been found that tags or remnants of iris tissue are present, even in those cases where it had not been detected clinically. Most of the cases reported as aniridia have been incomplete, and the term incomplete aniridia would be more properly applied.

I wish to report a case of complete bilateral aniridia of a male child, fourteen months of age. The child was

brought to the office on May 12, 1922, the mother stating that "since birth her child's eyes did not seem quite right."

Examination in this case showed a clinically complete coloboma of the iris, associated with normal fundus and media, in either eye. At the age of fourteen months, exact vision is problematic. However, with such tests as could be applied, the vision appeared quite good. A large percentage of these rare cases of complete coloboma are associated with nystagmus, strabismus, and often with such associated anomalies as conical cornea, opacities of the cornea and lens, vitreous opacities, atrophic choroidal spots, and detached retina. In this case there were no associated anomalies, and the ophthalmoscope did not indicate any refractive error of moment.

The etiology of aniridia is theoretic. Altho more than fifteen theories, urged by as many good authors, have not been proven, there is no doubt of its being a congenital defect of development, and not a destruction due to intrauterine inflammation. On making a study of case reports, a striking family tendency, as in the case of all congenital anomalies of the eye, is found, as, for example: De Beck found seven cases of aniridia (complete and incomplete) and two colobomata, in three generations; Gutbier found ten cases in four generations; Galezowski thirty-one cases in three generations; Mohr, a mother with complete, and two sons with partial; Gutfreund, a father and daughter with complete aniridia; Hamilton, a father and three sons; Despagnet, thirty-one members in one family. Excluding these just mentioned, there are a number recorded in the literature which for convenience are classified as follows: direct hereditary, 18 mothers to 31 children, 10 fathers to 19 children, and 7 showing collateral heredity. In my case, a careful survey of the family history did not reveal any eye anomalies.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Section on Ophthalmology.

February 16, 1922.

Dr. McCluney Radcliffe, Chairman.

Externus Corrected by Tendon Transplantation.

Dr. William Campbell Posey exhibited a boy 12 years old, in whom the right eye had deviated markedly inward since birth. The rotation of the eye was normal, with the exception of outward motion in the right eye, which was absent. O.D. V. = 20/70, O.S. V. = 20/20. Double advancement of the rectus internus by the twin single stitch method was determined upon, but no trace of the right externus being found, tendon transplantation was performed; the outer halves of the exposed superior and inferior rectus muscles being united with the external portion of Tenon's capsule, which was advanced as far forward as possible. The left externus was advanced and the internus of the same eye was tenotomized. The results were surprisingly good, external rotary movement in the right eye becoming almost normal in extent and the visual axes parallel.

To what should be attributed this establishment of external rotation in the right eye? To the advancement of Tenon's capsule alone, or should we presume that the innervation of this tissue from some of the transplanted fibers of the superior and inferior rectus had an effect? It is difficult to conceive how partial tendon transplantations may be of value, when the muscle which is to receive the innervation is found to be absent, yet this is the second case which he had shown to the Section in which rotation of the eye in the zone of action of the absent muscle had been made almost normal. The refraction under atropin is as follows: O.D C. + 3.50 D. ax. 120° = 20/50. O.S. S. + 1.75 D. ⊃ C. +0.75 D. ax. 90° = 20/20.

Discussion.—Dr. H. F. Hansell said in Dr. Posey's rare case of congenital absence of the external rectus muscle, the question of binocular single vision should be considered. The operation is a brilliant success, and the power of external rotation of the eye given by the transplanted muscle is of value. It would be of interest to know whether diplopia is present, and the relation of the images to each other. The fusion center, located somewhere in the cortex, is either absent or undeveloped. Without it binocular single vision is unobtainable, and the patient is beyond the age where Worth's methods might be available.

In answer to Dr. Hansell, Dr. Posey stated that he doubted if binocular single vision could be obtained in this case, on account of the lowered degree of vision present, resulting from the high astigmatism and from the partial amblyopia from disuse.

Involvement of Ocular Muscles due to Focal Infection of the Teeth.

Dr. L. Waller Deichler (by invitation) read a paper, in which he described in detail the case histories and symptoms of two patients presenting muscular involvement, and one patient showing fundus changes as a result of focal infection.

Case 1. Male, aged 65 years, suffering from vertigo. The case was diagnosed as palsy of the left superior rectus and right superior oblique with paresis of the right superior rectus, left internal rectus, right and left inferior obliques, left superior oblique and moderate impairment in the action of the right internal rectus and both external recti. X-ray showed absorption of the alveolar processes about the roots of the remaining teeth, with pyorrhea and pockets containing pus.

Case 2. Female, aged 20 years, complaining of vertigo, occipital headaches, eye fatigue when reading and tilting of the head toward the right shoulder. Observation disclosed a progressive exophoria and a constant

right hyperphoria. A discharge of pus thru the gum from a dental abscess was followed by prompt relief of the ocular symptoms.

Case 3. Male, aged 36 years, complaining of visual impairment. Vitreous opacities obscured a view of the right fundus. In the left fundus, blurring of the disc, edema and a granular appearance of the retina was noted. Dental X-ray showed: Pyorrhea, apical abscesses, pericementitis and a large abscess with necrotic bone about the roots of the left lower first and second molars.

Simplified Operation for Pterygium.

Dr. S. Lewis Ziegler stated that in operating for pterygium he had always been impressed with the fact that the growth was composed chiefly of hypertrophied subconjunctival tissue, more or less cicatricial in character and with a tendency to contract. He had for many years performed a simple operation based on this suggestion, which had been a success cosmetically and so far as he knew free from recurrence.

After severing the head with a Beer's knife and the neck with conjunctival scissors, the forceps are handed to an assistant who holds the flap taut, while the subconjunctival tissue beneath the flap is grasped by a second pair of forceps and carefully dissected off from the conjunctiva with the small scissors. The apex is then excised and the conjunctival wound closed by two sutures, which may cause overlapping of the corneal margin by the conjunctiva. This is usually clipped in several places by scissors and pushed back until the surface is smooth. Where a larger surface is bared two sets of liberating incisions are made above and below and the wound closed with three sutures. This technic of thinning of the tissues by subconjunctival excision can also be applied to other pterygium operations with considerable advantage, because it makes a thinner flap.

Retinochoroiditis with Corneal Opacity.

Dr. Wm. Zentmayer exhibited J. B., aged 25 years, presenting in O. D. an area of retinochoroidal exudation about four disc diameters by one disc diameter in size, below the macula, with a slight descemetitis and increased tension. The Wassermann and v. Pirquet were both negative. Several dental apical abscesses, enlarged tonsils and hypertrophied turbinates. Urinalysis showed a slight trace of albumin but no casts.

Fields contained an absolute scotoma, corresponding to the fundus lesion. The tonsils were removed. Ten days later, the left eye exhibited a group of pin point to pin head sized subepithelial deposits, grayish in color and occupying an area horizontally oval in the center of the cornea. A few days later the right eye showed the same condition. The dots persisted about two weeks. Subsequently there were recurrences in both eyes. At no time did they stain with fluorescein, nor did the epithelium appear to be exfoliated. They resembled somewhat superficial punctate keratitis.

Examination with the corneal slit lamp microscope made by Dr. Arthur J. Bedell, of Albany, revealed that these opacities were situated some in the anterior part of Bowman's membrane, and some in the posterior layers of the substantia propria, and in the right eye, possibly on Descemet's membrane.

The supposedly affected teeth were extracted and showed only periapical disease. The nature of the corneal condition is not clear. It is a transient relapsing one. The only etiologic factor traced in the case is a focal infection. This may have had its origin either in the tonsils or teeth, and the presence of albumin in the urine seemed to indicate that the toxin had affected not only the eyes but also the kidneys.

Whether this clinical observation is of any value in determining the etiology of this condition, it at least would seem to indicate the toxic origin of these opacities in this case. It may be recalled that Verhoeff attributes these infiltrates to the action of pyogenic dif-

fuse toxic substances acting on the nerve terminals.

Operation for Ptosis.

Dr. T. B. Holloway presented two cases showing the results of a Hess operation for ptosis. At the time these cases were placed on the program, it was his intention to present them owing to complications that had arisen following operation.

Case 1. A boy, with slight epicanthus and unilateral ptosis of the left eye. The palpebral fissure on the affected side measured 4 mm. There was marked impairment in the upward rotation of the globe. Following the operation, an abscess developed in the upper lid. It was feared for a time that the result would be a poor one, but contrary to expectations it has been excellent.

Case 2. A male adult, with unilateral ptosis of the left eye and defective upward rotation. The width of the palpebral fissure was 3 mm. A hematoma followed the insertion of the innermost suture. Subsequently the lid became red and puffy, and considerable sanguineous pus was evacuated thru the outer end of the eyebrow incision. Despite this complication, the result has been excellent and the palpebral fissure of the same width as in the other eye.

Discussion.—Dr. Wm. Campbell Posey said about a year ago Dr. Heed exhibited a case before the Section showing excellent results obtained by the Hess method in correcting ptosis. As Dr. Posey had performed this operation a number of times, also with satisfying results, and in fact was just discharging a case from the hospital in which the operation had been most successful, he gave his testimony as to the value of the procedure.

A few weeks later, however, he had an experience which caused no end of anxiety and had led him to modify his views somewhat regarding the procedure, for in attempting to raise the lid of a lady 46 years of age, which had drooped since the patient was 9 years of age, following an attack of scarlet fever, vision, and indeed the eyeball itself, were nearly lost, in consequence of a keratomalacia, or rather of an intense uveitis with some orbital involvement following the exposure of the eye after the protective covering of the lid had been removed. The operation was performed as usual, the sutures were tied, and the usual sterile vaselin dressing was applied.

Twenty-four hours after the operation, however, the patient complaining of some pain and a sticky sensation in the eye, the dressing was removed, and the cornea found to be slightly hazy in the pupillary center. All dressings were at once removed, except a slight protective one at night. The cornea was kept moistened with liquid vaselin, atropin was instilled, and the eye flushed gently three or four times a day with a boracic acid solution. Twenty-four hours later, in spite of this, the corneal haze had spread towards the periphery, and in another 24 hours the entire epithelial and subepithelial layers of the cornea were hazy. There was also some chemosis of the bulbar conjunctiva. Realizing the danger of the situation, the stitches raising the lid were removed and the lid permitted to drop down over the cornea.

Despite this, however, there was no betterment in the symptoms, indeed both the corneal haze and chemosis of the bulbar conjunctiva increased, and there was some swelling of the lids. The site of the sutures, however, showed no infection, nor was there any discharge from the conjunctiva, the ocular condition being allied to a keratitis neuroparalytica, with uveitis and mild orbital involvement. This diagnosis was concurred in by Drs. de Schweinitz and Fox, who saw the case in consultation, and who greatly aided in their therapeutic suggestions. In addition to the local measures just outlined, constant application of ice was ordered and 10,000 units of diphtheria serum injected hypodermatically.

The local conditions gradually improved, so that the patient was discharged at the end of a month, with the eye fairly quiescent, but with a central haze of the cornea. Seen at the expiration of five months, the patient

living at a considerable distance, the corneal haze was less. Vision, however, equaled but 5/60; prior to operation it had been 5/15, this reduction being due to a slight amount of near-sighted astigmatism. Massage of the globe with yellow oxid salve and the use of hot compresses is still persisted in, in the hope of still further clearing vision. The position of the lid is much the same as it was before the operation. Perhaps on account of the cicatricial bands originated by the sutures, there is now some slight elevating power.

Dr. Wm. Zentmayer stated that Hess advised, during the period of lagophthalmos following this operation, the eye should be protected by a watch glass, after the manner of the Buller shield, as illustrated in Meller's book.

Dr. S. Lewis Ziegler suggested that in cases of corneal exposure after the Hess operation, the cornea might be protected by adjusting a small celluloid shell as a protector to fit directly over the cornea, like the ones he used in cases of corneal tattooing.

Dr. Holloway stated that following this operation, he always resorted to a dressing made up of a Ring mask in which the prominent part corresponding to the eyes had been cut away, and on the side corresponding to the operation, the opening was covered with transparent celluloid. These were the first instances in which he had any complications following this operative procedure, and it had been his original intention to present them as complicated cases, but he felt that the final result was just as good as in those cases where no complication had occurred. In each patient there was an exaggerated Graefe sign on the affected side, and in each instance the palpebral fissure became distinctly wider when the eyes were rotated strongly to the left, i. e., towards the operated side.

It was also stated that a thoro and complete dissection, almost to the margin of the lid, was important; this applied particularly to the lateral extremities. Owing to the fact that the lid sutures almost invariably cut thru, Dr. Holloway believed the use of small plates, metal or rubber, would be of service.

Flashlight Reflex of Macular Region.

Dr. P. N. K. Schwenk showed a case of search light reflex at the macula in a boy 11 years old. His right eye is nearly emmetropic, the left having a myopia of 8 diopters. The left eye has a small central white depression at the macula, which gives off a cone of light like a search-light. Frost, in his book on Fundus Oculi, says: "this phenomenon was first described by Marcus Gunn, who says it usually is associated with myopia, and called it the policeman's lantern reflex." The search-light reflex seems to Dr. Schwenk to be a better analogy, as the search-light may not have been known in Dr. Gunn's day.

Charles R. Heed, M.D.,
clerk.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY.

January, 1922.

Corneal Opacities and Optic Atrophy.

Dr. T. R. Mullen presented Mr. D. C. B., age 37. Twelve years ago got a piece of steel in the left eye and had it removed under cocain anesthesia. Had influenza in October 1919 and was sick for two weeks, after which his vision was not as good as before his sickness. On April 4, 1921, he came for glasses and the vision of his right eye was 20/30, left eye 20/100, with a few small dark grayish spots in the center of the left cornea. Cylinder lenses gave him vision of a little better than 20/30 in the right eye and 20/70 in the left. On November 8, 1921, he called again and vision of his right eye was 20/100 and the left eye 20/100. Stronger cylinder lenses gave him only a little more acute vision. After dilating his pupils, the optic nerve showed some paleness, with optic atrophy in the right eye, and the corneal opacities in the left eye showed an increase in number and were darker in color. He stated that he drank considerably and smoked a great deal.

Discussion.—Dr. S. R. Gifford, after examining the case with the slit lamp,

stated that the pigment deposits were on the anterior surface of the lens and were probably deposit from the pigment epithelium of the iris due to previous iritis. Since he had had steel in the eye, however, the possibility of siderosis should be considered, altho the location of the deposit is not typical of it.

Dr. H. B. Lemere mentioned Weekers' article on siderosis bulbi, and thought the arrangement in this case reminded him of the picture in that article.

Corneal Opacity, Birth Injury?

Mary G., age 11, (school girl) came on December 9, 1921, with an inflammation of the right eye which, on examination, proved to be pneumococcus conjunctivitis. This lasted a few days, and then cleared up, and on examination, I found in the left eye a small corneal opacity with a small dark spot in the center of the pupil, and a spider web formation toward the temporal side. Vision in the right eye was 20/20, left eye 3/200. Her father states that her eye was injured by the physician at the time of her birth. She did not know until I examined her that her vision was not as good in one eye as the other.

Discussion.—Dr. J. M. Banister thinks the opacity is on the anterior part of the lens as revealed by the paralactic displacement.

Dr. S. R. Gifford says that the slit lamp shows something resembling the remains of pupillary membrane apparently resting on the anterior surface of the lens in the center of which, however, is a dark brown mass, for which he is not ready to offer any explanation. He recalls the frequency with which recent observations with the slit lamp had found remains of pupillary membrane in apparently normal eyes.

Corneal Lesions from Smallpox.

Dr. J. M. Patton reported the case of Robert R., a man of 32, recovered from smallpox seven weeks before his first appearance. One week after recovery, got an inflammation of his right eye, which had been present since. On examination, his vision was 20/200 in the right eye and 20/20 in the left. The right eye showed a typical smallpox infiltrate in the lower half of the cornea. It had been treated for about one week with atropin and hot applications. At one point, where the surface had broken down, iodin and trichloracetic had been used two or three times. During observation, the lesion had hardly changed appreciably. There was still a good deal of congestion. These cases generally run a definite course in spite of treatment.

Discussion.—Dr. S. R. Gifford described the appearance of the lesion, as seen with the slit lamp, as a dense infiltration which is in the deep layers of the cornea, but the advancing margin consists of delicate streamers of infiltration just beneath the epithelium.

Wood Alcohol Amblyopia.

Dr. Maiden reported a case of wood alcohol poisoning. The patient, 22 years, truck driver, came with vision R.E. = ability to count fingers at four feet; L.E. = ability to count fingers at three feet. His vision had gradually been failing for the last three weeks. Media clear. Right eye showed slight papillitis. Pupils dilated slightly. No history of possible etiology could be obtained. Patient did not use alcohol. Wassermann was negative with blood and spinal fluid. It was then discovered that in his work as a truck driver, he used wood alcohol in the radiator, and in cold weather this radiator steamed a great deal, filling the cab full of steam. On one day, the smell of the alcohol had been so severe that he had vomited several times. It was a few days after this that his vision began to decrease. He was put on eliminative treatment, Fisher's solution and potassium iodid. After a week or so, his vision improved to 20/30. There is still some papillitis to be seen in the right eye. The alcohol used in the radiator was tested and proved to be wood alcohol. The patient's urine showed the presence of formic acid, so that the case was considered as one of toxic amblyopia from wood alcohol.

Discussion.—Dr. Patton mentioned having seen one case in a woman, who

had been polishing a stove with polish containing wood alcohol, another who had been varnishing in a closed room, and another in a man who had been priming a stationary engine under a hood with wood alcohol.

Some Third Nerve Reflexes.

Dr. J. P. Williams of Lincoln, read the paper published on page 642.

Discussion.—Dr. Teal expressed himself as being particularly interested in cases of vertical imbalance. Most of us can recall the time when anyone who used prisms in a prescription was looked down on by the profession. This is no longer true. Dr. Dean in his paper presented before the Academy, has proved the value of prisms by a large series of cases in which they had been prescribed with entire relief of symptoms. He reports the case of a former associate who wore in his prescription a nine degree prism base vertical, and thirteen base out with perfect relief of symptoms. At the meeting of the Academy, he noticed how many prominent oculists agreed with Dr. Dean in the use of prisms. He believes it is as important to relieve latent hyperphoria with prisms as it is to relieve latent hyperopia with spheres.

Dr. Banister was especially interested in the subject of scintillating scotoma, as he himself had suffered with it for years, and this is the first paper he has seen on the subject for years. He suggests that scintillating scotoma is due to toxic absorption, and the headaches due to the spasm of the cerebral arteries. During the attacks, he would have complete aphasia and would have a right sided hemianopsia. After such an attack, he always found that his stools were light colored. Spirits of ammonia would relieve the immediate symptoms, and a cathartic would prevent their recurrence until some later time, when he became constipated again. He believes it is absorption of the toxins which causes the spasm of the cerebral arteries. His two sons had similar symptoms with similar relation to constipation.

Dr. Patton: Dr. Williams has given us a very valuable paper on a subject to which we have not paid as much attention as it deserves. It has been our custom to emphasize the correction of refraction and of toxemias more than defective muscles.

Dr. Lemere believes that Dr. Williams has covered the subject in a unique way, in a case of hyperphoria which had a sudden attack of dizziness with falling, and which subsequent history proved to be due to muscular defect. This case alone would make the paper valuable as a reference. We have all seen reflexes from bright light in some degree, but have not followed their history closely enough to get the etiology. He suggests the value of remembering this in cities, such as Omaha, where the down town district is in the eastern part and the residence part in the west, necessitating driving against the sun both morning and evening.

Dr. Bushman said the paper had confirmed his opinion with regard to the importance of the effect of strong light. We have all seen cases of people working in offices who show more symptoms than refractive error, and a careful questioning often discloses a history of improper lighting conditions. The vision in these cases by refraction may actually increase symptoms instead of relieving them. He believes the use of prisms has been overlooked. He recently heard quite a prominent oculist say that he did not correct muscular defects, only errors of refraction. His partner, Dr. Bryant, wore a 20 degree prism for esophoria constantly. This relieved him from the symptoms and the esophoria gradually cleared, so that the prisms were no longer needed.

Dr. Banister was especially glad to hear the lively discussion on muscular defects. A paper read at Denver disclosed the fact that very few people have yet considered the subject of muscular error of any importance. He thinks the doctor's work with prisms splendid. He differs with Dr. Williams in that when the muscular defect is more than six degrees, he operates by a tuck. In cases of defect of the vertical muscles, he does not use prisms for marked lateral defects. He

thinks such use of prisms actually increase the muscular error. The defective muscle needs exercise with the prisms, and by the use of prisms of increasing strengths, many cases are relieved. If this is ineffective, he does a tucking to get the required amount of convergence. He does the same in cases of esophoria if over four degrees.

Dr. Maiden stated that he has seen Dr. Dean's work, and that he does obtain results by as weak a prism as one degree base in. He tries in all cases to check up on the muscular errors with prisms. There is a good deal of difference in individual patients, some not standing even a weak prism, and others a rather strong one without discomfort.

Dr. Woodward emphasizes the importance of excessive light stimuli. He had a patient who was relieved of very severe symptoms by simply decreasing the strength of the electric light bulb which she used for reading.

Dr. Williams, in closing, believes that toxemia is an important factor in these cases but light influences are often hard to detect, especially in school children, and these may often be the real cause of the symptoms. He reports the case of a man of 38, who had scintillating scotoma, who was relieved by giving him a plus one for reading. Many cases can bring on symptoms at will by looking at a strong light. He remembers one man who had to drive two hundred miles southward against the sun. During the drive, he had severe symptoms, whereas on the return drive with the light at his back, there were no symptoms at all. The attacks he had been having were relieved entirely by using a shaded light.

S. R. Gifford,
RECORDING SECRETARY.

MEMPHIS SOCIETY OF OPHTHALMOLOGY.

March 21, 1922.

An Unusual Vitreous Opacity.

Dr. A. C. Lewis reported the case of J. P., a negro man aged 29, who came to the O. P. D. eye clinic several weeks ago complaining of dimness of vision in the right eye.

No history of injury, but his eyesight has been gradually getting dim in this eye for 2 or 3 months. Vision O.D. 20/50; O.S. 20/20. Muscles and fields normal. Pupillary actions normal in both eyes. Wassermann negative, urinalyses negative.

Ophthalmoscopic Examinations.—Directly over the optic disc, with the addition of a plus 4.00 lens to the one used in examining the disc, we see a thin oval opacity of bluish color 2x3 mm. in size. It is seen to be thin enough for some light to pass thru. The nasal rim of the opacity is slightly denser than the remainder of it.

Discussion.—Dr. J. D. Stanford thinks the opacities are on the posterior capsule. There is something forward and below, which appears to be a retinitis proliferans.

Dr. E. C. Ellett said that this seemed to be more like hyaloid remains. He does not think it is on the posterior capsule. It appears to be more of a retinal detachment.

Sympathetic Ophthalmia.

Dr. E. C. Ellett reported a case of probable sympathetic ophthalmia. The left eye of a young woman was cut with glass on Dec. 28, 1921, the cornea being cut across. It was covered with a conjunctival flap. On Jan. 12th, the eye was soft, vision zero and the scar was depressed. The eye was removed and a glass ball put in Tenon's capsule. About Jan. 28th, O.D. become a little blurred. Feb. 1st, vision which had been 20/20 was 20/70, but 20/20 with —1. The eye was normal. Feb. 2nd it required —3 to bring vision to 20/20, and the retina was edematous. The glass ball was removed. Slight ciliary injection, a mild iritis and retinal detachment developed. The eye is soft with vision perception of light. The treatment was energetic; sweats, mercury, salicylates, atropin, hot applications, rest in bed and removal of all possible sources of focal infection.

Glaucoma.

Dr. Ellett reported the case of a woman, aged 59, who had trachoma for 27 years and for a month pain and poor

vision. There were all the symptoms of glaucoma. Tension O.D. 66, O.S. 72. A Lagrange operation was done in the right and trephine on the left eye. After two months the tension was normal in O.D. and 34 in O.S., and vision had risen from 1/200 in each eye to 20/70 and 20/100.

Mrs. U., aged 78, was seen in May, 1917. Her vision was poor. In O.D. =20/25, and J. 10, brought to normal with glasses. O.S. vision in temporal field only. Pupils, O.D. 4 mm. and movable; O.S. 5 1/2 mm. and fixed. Fields narrowed. T., O.D. 55, O.S. 50 (McLean). The right nerve was probably slightly cupped, the left distinctly so. In both eyes there were yellowish dots all over the posterior pole, which might be colloid deposits on the lamina vitrea, or might be retinitis circinata. She has two daughters whose eyes show the same thing, and on one of whom he has operated both eyes for chronic glaucoma. The fundus condition has been diagnosed choroiditis in the mother and one daughter, and albuminuric retinitis in the other daughter.

Left eye. Eserin was ordered and used for two years. In October, 1919, she had acute glaucoma in the eye and Dr. E. removed it.

Right eye. In spite of the constant use of miotics the tension in this eye remained high. The field contracted. The lens is cloudy, and the refraction has changed on that account to—2.50, with which she gets 20/30. On account of the contracting field, an operation was advised.

On Dec. 29, 1921, a Lagrange operation was done. The surgical result is very good. The filtration area seems to be limited by the scar outlining the conjunctival flap, so that there is quite a firm mass adjoining the limbus above. The vision is now 20/100. The tension is normal.

Complicated Cataract.

Dr. E. C. Ellett reported the case of Mrs. D., seen in August, 1904, then aged 45. Her vision was poor and she had a marked convergence of the left eye, of which she did not seem to be aware. The cornea was half hidden by the inner canthus, and she could not turn the eye out beyond the median line. The family thought this trouble had been present for about 5 years, and was getting worse. There were some vitreous opacities and quite a high myopia. Vision was 20/60 in each eye with—12.00 O.D. and—13.00 O.S. She did not have binocular vision. In 1907 the vision was 20/100, not improved by glasses. Both eyes showed opacities in the lens and vitreous. No history of syphilis.

For cosmetic purposes a tenotomy of the left internus and advancement of the left externus was done on the left eye, with considerable improvement. She was given mixed treatment.

Dr. E. did not see her again for 13 years, i. e. in 1920. The vision in the right eye had continued to fail, and in 1915 she had a cataract extraction on this eye, followed by two capsulotomies. The eye showed a coloboma upward, a considerable membranous opacity, marked convergent squint and inability to turn the eye out beyond the median line. Vision light perception.

The left eye, on which the muscle operation had been done, was straight, but could not be moved outward. There was a mature black cataract, and vision was equal to moving objects. In July, 1920, a simple extraction was done on this eye. On grasping the capsule with forceps the lens was dislocated, but could not be extracted in the grasp of the forceps, or with pressure, so it was delivered with a wire loop. There was a loss of some very fluid vitreous and slight collapse of the ball. The lens, which was a dark amber with an almost black nucleus, was delivered in the capsule.

After a normal course for 8 days, the eye developed an intense chemosis of the conjunctiva, and watered profusely, the vision was poor and the reflex dim. On atropin, aspirin, ung. hydrarg. and hot applications, the eye cleared some, and she went home two weeks after the operation. Dense vitreous opacities could be made out. A month later she returned. The vision was very dim. the eye red, soft and shrunken. This condition had come on suddenly and

without apparent cause. It was so soft that it wrinkled from the pull of the muscles when moved. Dr. Stanford, who saw her then, thought she had total retinal detachment. A week's treatment by rest, atropin and mercurial innunctions resulted in a slight pink reflex to the nasal side. Two weeks later a good reflex could be obtained in every direction and a few vessels could be seen. There were many vitreous opacities. No test of the vision was made, but she saw very little, and we did not want to discourage her by calling attention to how little. She then went home on mixed treatment in Sept. 1920.

She kept this up for a year and returned on Dec. 8th, 1921. The eye looks perfect, surgically. The ball is full and white, with a round central pupil and fair motion. With—10. she sees 20/200. The field is not noticeably contracted, the tension is normal and there are a few vitreous opacities. The eye ground shows normal nerve and vessels. The retinal pigment is extensively absorbed, and heaped in places, sometimes on the vessels, as in retinitis pigmentosa. The restoration of this eye appears to border on the miraculous.

Injured Eyeballs.

Dr. E. C. Ellett reported on four cases: J. F. B., aged 35, who was shot in O.D. with No. 6 shot on Jan. 27, 1922. Wound in cornea above center. X-ray showed shot 32 mm. back of cornea. Enucleated eye Feb. 26th for iridocyclitis. Shot was found behind the ball. Specimen showed exudate in anterior chamber and vitreous, cataract and detached retina.

2. L. F., aged 16. Hurt right eye by a fall when a baby. Cornea small, opaque and distorted. Enucleated Feb. 27th, 1922. Specimen shows anterior chamber full of an organized mass of tissue passing thru the pupil. Pigmentation of fundus and cupping of disc. Angles of anterior chamber obliterated.

3. E. L., aged 10. Examined three weeks after injury by a wad of paper with a pin in it. The eye was red and painful, pupil dilated and a yellow mass visible in the vitreous. Specimen shows much vitreous and subretinal exudate, and total retinal detachment, some hemorrhage.

W. H., aged 32. Right eye blind for 8 years. No apparent cause. Inflamed and painful, 6 days. Eye acutely inflamed, pupil dilated, tension 32 Hg. and 60. Capsule covered with exudate and iris discolored. Ball tender, no F. B. Enucleated March 7th. Lens shrunken and very dark nucleus. Angle of anterior chamber closed.

S. S. Evans,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

March 20, 1922.

Dr. Frank Brawley, in the chair.

Melanoma of Choroid.

Dr. George F. Suker presented a case which was described by Dr. J. C. Stein.

A school boy, aged 14, entered Cook County Hospital on March 6, 1922, complaining of crossed eyes. About seven years ago the patient recovered from diphtheria, after which it was noted that his left eye was turned in. Some months later he was operated upon for the convergence of the left eye, but later the strabismus recurred. The family history and physical examination were negative. No pigmentary spots were noted anywhere on the surface of the body. Right, vision 0.6; left, 10/200; convergent deviation of the left eye 30°; secondary deviation equal to primary deviation. Conjunctiva, cornea, iris, lens, and vitreous essentially negative, and the pupil reactions were normal.

Fundi: Right eye; the optic disc was normal. Two and one-half disc diameters above it, and slightly temporal was seen a definitely circumscribed area about twice the size of the optic disc. The nasal side of this area was just temporal to an imaginary vertical line touching the temporal side of the optic disc. The patch was rather sharply defined, resembled the human heart in shape and was apparently situated in the choroid. The retina over

it was not raised or depressed. The superior temporal vein coursed over this and divided in its inferior temporal quadrant; one branch passing directly temporal, the other superior and temporal. Several small arterial twigs arising from a branch of the superior temporal artery passed over this circumscribed area. No change in the level of these vessels was noted. This sharply circumscribed smooth area appeared of slate (blue ointment) color, somewhat stippled and somewhat thinner in a few places, allowing the choroidal circulatory system to show thru. This condition was especially noted in the superior nasal portion of this area, where the margin was rather uneven and feathered.

Left eye. Essentially negative, except for a vertical elliptical disc. Scotoma mapping was unsatisfactory.

Hospital Diagnosis: Melanoma of the choroid (nevus—pigmented mole) of the right eye; left concomitant convergent strabismus with amblyopia ex anopsia.

Pulsating Exophthalmos.

Dr. Suker also presented a case described by Dr. Cottle.—This patient entered Cook County Hospital, Feb. 20, 1922, with the history that he had been shot thru the left cheek on January 3, 1922, the bullet passing thru the cranial cavity. Two attempts had been made in another hospital to remove the bullet. Five days following the injury, the left eye began to swell, the lids became edematous, and in the course of the ensuing week he lost all vision and movement. He stated that he could feel "a pumping in his eye" and "a roaring in the left ear." He was unable to open the mouth fully, owing to fracture of the left ascending ramus of the mandible.

Examination showed the lids markedly edematous and pendulous, forming a swelling which rose over an inch from the surface, and involved an area 2 1/4 inches horizontally. The inner margin of the swelling was formed by the nose, while temporalward, it reached the margin of the orbit. The superior orbital crest limited the swelling superiorly and inferiorly a marked bagging of the lids was present. The swelling was soft and doughy, and not tender to the touch. Retraction of the lids revealed the conjunctiva to be swollen, red, soft and succulent. The eye was proptosed at least a centimeter and a half, and immobile. The greater part of the cornea was replaced by a disciform, yellowish-white, irregular, mass, surrounded by a clouded rim of cornea, 2 mm. wide. This was insensitive.

A distinct pulsation could be felt over the whole eye, and a distinct to and fro bruit, synchronous with the heart beat, was heard not only over the eye, but over the whole cranium, being especially loud on the left side and not affected much by the position of the head, but was louder with the head held low. Pressure over the left common carotid artery for ten minutes reduced the edema of the lids very markedly. The central and posterior walls of the cartilaginous portion of the left external auditory canal showed recently healed irregular wounds, about 0.8 in diameter. In the left ear the whispered voice was heard only on contact, and the spoken voice was materially reduced. The Weber was not definitely lateralized; the Rinne was negative. X-ray examination revealed the bullet fragments in the region of the mastoid, but none elsewhere. There was no X-ray evidence of basal skull fracture.

On March 3, 1922, the left common carotid artery was ligated with two braided silk sutures a centimeter apart. The following morning the patient was in excellent spirits. He no longer felt the throbbing nor felt the ocular pulsation. Both radial pulses were good and equal. The swelling of the lids and proptosis were measurably diminished. On March 12, a leech was applied to the upper lid with some beneficial effect. About this time, very close observation revealed the fact that only in the prone position some pulsation was still present, as was also the murmur over the cranium. However, the swelling gradually became less; and the eye which was previously fixed and anesthetic became somewhat movable and sensitive. Hearing was also

slightly improved (spoken voice at 15 feet).

It was thought that the pulsating exophthalmos was the result of an aneurysm of the internal carotid into the cavernous sinus, the sequel of a basal skull fracture, which in turn was due to a gunshot injury of the temporosphenoidal region. Because pressure relieved the symptoms and produced no dizziness or other cerebral manifestations, the indication was to tie the common carotid, not only for the local eye condition, but also as a prophylactic measure against intracranial hemorrhage and involvement of the right cavernous sinus. That the pulsation and the murmur were still faintly present when the patient was in the prone position is evidence that the collateral circulation is adequate and compensatory in the left cerebral hemisphere.

Discussion.—Dr. George F. Suker thought the interesting feature of the first case was the accidental finding of the melanoma of the choroid in the course of an examination for refraction and strabismus. Melanoma of the choroid was exceedingly rare. The etiology was that of the ordinary mole as it belonged to the class of moles. Because of this etiologic factor there was, as in every mole, an inherent malignancy, but not necessarily an active one. Whether this boy might receive a blow upon the eye which would transform this latency into an active malignancy was questionable. An active inflammatory process in the neighboring choroid could excite this latency. The peculiar mulberry color was another characteristic feature. Because of the stippled appearance of the growth there was a little more than the ordinary tendency to malignancy, the same being true of moles elsewhere.

The pulsating exophthalmos patient was operated upon for an orbital abscess at another hospital. An interesting feature was that it was a true aneurysm of the internal carotid artery, and that every possible vessel was pulsating. The entire venous supply of the orbit and adnexa was transformed into an arterial supply. There was not only the passive congestion that might have been in the venules, but an active congestion because of the arterial circulation. Whether it would become necessary to tie the common carotid on the other side was a question. This had been done in some instances, but he doubted the advisability of such a step. Continuous pressure upon the common carotid had never been of any permanent value, nor had the injection of agar or gelatin into the cavernous sinus. The ligation of any of the orbital vessels in this case was absolutely contraindicated as the orbital vessels were not the site of the aneurysm.

The patient had what was a true trophic keratitis, and Dr. Suker believed that the only real trophic keratitis was from a complete mechanical obstruction of the fifth nerve and the cavernous plexus of the sympathetic. Loss of sensation in every branch of the fifth nerve would give a pseudotrophic appearance. What the eventual outcome of the case would be, he did not know, but he felt that the return of the circulation and the minute bruit was a distinct sign that the left hemisphere of the brain received its necessary blood supply. Up to the present time, no cerebric manifestations followed the ligation of the common carotid artery.

Weak Atropin Solution for Asthenopia.

Dr. William E. Gamble stated that eye and *headache* resulting from induced spasm of the sphincter iridis and ciliary muscle by the instillation of eserin was a frequent observation in his work, the discomfort usually being relatively slight, but in many cases much pain was produced. Recently one instillation of a 2 per cent solution in the eye of a physician produced so much eye pain, that he had to be sent home in a cab and did not recover from the pain until the next morning. Part of the discomfort experienced in passing from a dark room into bright daylight was produced by the rapidly contracting pupils.

While with properly fitting glasses, most persons could endure the accom-

modative spasm of their ciliary muscle in doing close work with but little pain or fatigue, there seemed to be an increasing number of those who could not. He thought that the rational treatment in these cases was to give less work to the tired eyes, to increase the nutrition of the patient and otherwise build up the general health. Unfortunately, many of them could not quit work. Temporary rest might be given by instilling a high dilution of atropin which should not dilate the pupil enough to annoy the patient and should not interfere with close work. He had found 1/200 of a grain of sulphat of atropin to an ounce of water dropped into the eye Saturday afternoons, for those who were doing close work the rest of the week, to give much relief. If used oftener, the results were better.

Dr. Gamble then narrated the history of three illustrative cases. It was not his claim that this treatment was anything but temporary, until change of conditions or general treatment gave relief. He was not sure but that in many cases an even weaker solution might be indicated. In some cases a 1/100 gr. to the ounce solution was necessary to give relief. The strength and frequency of its use varied in different individuals. This particular solution was offered as a guide. Carelessness in filling the prescription should be carefully guarded against.

It would seem that the use of it was indicated more particularly between the ages of 18 and 35 years. In younger persons, the stress and strain of life had not yet produced neuroses; in the older, the pupil becomes more sluggish with advancing years, and the accommodation less with the increasing sclerosis of the lens. He was of the opinion that in many hysteric patients, the photophobia was of the trigeminal and not of the retinal type. The mechanical pressure on the nerve endings in and about the sphincter iridis was the source of the discomfort. It was rare, in his experience, to have seen indications for the use of this solution in men; practically all of the patients had been young women. He reported his experience with this drug, with the hope that indications for its use would be more carefully worked out by others than he had been able to do.

Discussion.—Dr. Harry Gradle asked Dr. Gamble if he had measured the influence this 1:100,000 solution had on accommodation, and whether he got the influence upon the sphincter of the iris or upon the ciliary muscle, endeavoring in that way to differentiate the origin of the pain due to the spasm.

Dr. Gamble, in closing, stated that he used 1/200 grain of atropin to the ounce of water as his weakest solution, and also used 1/100 of a grain as a maximum solution in this work.

He was interested in the question of Dr. Gradle. The second case to which he referred did not have an exaggerated contraction of the pupil, but had fatigue; and he thought in that case it was probably a hyperesthesia of the ciliary muscle. But in the other two cases, particularly the last one, the thing that struck him first was the way the pupil came down. It was more like the contraction found in a child. The patient complained of photophobia and wore No. 3 smoked glasses without relief. It was impossible for her to go out in an automobile, but by giving her 1/200 grain of atropin solution that symptom disappeared and she no longer complained. Consequently, he reached the conclusion that the greatest trouble with her was a spasm of the sphincter iridis pressing upon the nerves of the iris. It was interesting to give atropin to relieve these cases.

Basic Visual Fields in Lesions of Optic Pathway.

Dr. George F. Suker illustrated his talk on the subject with graphic fields (40 odd sets) and the discussion was limited to lesions of the nerve, crus, chiasm, tract, primary centers, optic radiations and cortex. The value of the field was many fold. By taking the field very accurately, many things could be ascertained which were of great assistance in the differential diagnosis, particularly between functional and organic lesions. It was possible to distinguish between cerebral and ocular pathway lesions. In some in-

stances, where the ophthalmoscopic examination was absolutely negative in every way, the field often gave a clue as to where the lesion was, particularly in amblyopia.

The manner of taking the field was very important, and the patients' facial contour must be considered. A narrow face with shallow temples, hollow cheek bones, raised brow and prominent eye would give a larger field, which was normal for that individual, than for one with a sunken eye and high cheek bones and large nose. The size of the test disc was also of value; the larger the disc, the larger the field, and vice versa for the normal individual. The field was always larger from the center toward the periphery than from the periphery toward the center, varying about five degrees in the normal individual.

In taking the color visions it was absolutely essential that the color be definitely seen not reddish, but red; not greenish, but green—in other words, color saturation. As one moved the color discs from the center they would change. Blue would often appear white, and green yellow. In dealing with retinal fatigue it was always desirable not to have the eye exposed too long; encourage frequent winking. The time of day and the light should also be considered. Dr. Suker believed in taking the field with good daylight, preferably north light; and did not consider it wise to take the field with any electric light or with a perimeter with an electric light attachment. The color and form perception of objects in north daylight were entirely different from that with electric light.

The larger the pupil, the larger the field; the longer the antero-posterior diameter of the eye, the smaller the field; therefore, the higher the myopia, the smaller the field. The patient should not be tried too long at one sitting. It was also necessary to consider the vertical palpebral aperture, as it influenced the height and the depth of the field. The field for form and color might vary greatly. It varied little for form in any normal individual. but the color varied greatly.

The visual cortex did not serve in perception of light only, but of color and form. The ability of the patient to recognize "C" or "A" or "B" in any particular part of a field, was essential in determining which part of the visual cortex was involved. This was an idea that needed further investigation and might lead to new facts thru taking visual fields.

One chart showed the combined visual field of the two eyes. It was of no diagnostic value and only showed that the combined was larger than the monocular. Behind the chiasm all lesions would present the same kind of a field, whether it was in the optic chiasm, or in the cuneus, or the tract or radiations, with this difference, that the further behind one got and the nearer the cortex, the less observable was the lesion to the patient, unless it became absolutely complete; and the greater was their symmetry.

Dr. Suker exhibited charts of conditions met with in military service, charts showing lesions of the optic tract and of the cuneus—unilateral and bilateral. He was most interested in the lesion of the cuneus, for the reason that the various interpretations of sight centered around there. The cuneus had nothing to do with the perception of form. A characteristic of the cuneus lesions was that they were very symmetric, more so than other lesions. In many of these cases the patients recovered to a large extent, and never recognized their lesions at all, until their attention was directed to them.

Fields did not give any further information than the location of the lesions. Lesions of the cuneus would not only give visual field defects, but would often have associated with them interferences with speech and possibly hearing. There might be complete blindness in the two eyes and the pupillary action still be present, owing to the fact that the optic nerve fibers were divided into two, one sensory and the other motor for accommodation and iris reactions.

The essential factor in taking a visual field was accuracy. A painstaking field would give the exact location

ot the lesion, depending upon the portion or portions of each field involved. If the lesions were behind the chiasm and optic nerve, there often would be general symptoms associated with them. There could be no bilateral involvement unless the lesion was in the chiasm, the tract, radiations or in the cuneus lobe, unless the lesion was bilateral.

Discussion.—Dr. J. F. Burkholder thought there was little to be said in criticism, because he presumed the findings had been corroborated postmortem. The association of fibers should be remembered. Dr. Suker had mentioned the association of the eyes thru the anterior fibers of the chiasm. Another tract had been worked out from the physiologic standpoint, which he mentioned six or seven years ago, the posterior portion of the claustrum. One could get an association between the visual centers of the two occipital lobes, particularly the cuneus, thru the posterior fibers of the claustrum, and that gave an association that would account for some of the visual conditions.

The recognition of letters for taking visual fields had escaped him, but it was a good point. Another difficulty which should be made clear was the tracing of the nerve fibers from the retina back to the cuneus. If Parsons was wrong and Fuchs right, there were three series of neurons in the retina. The first series would be the rods and cones; the second would be the bipolar cells, and the third series would be the large ganglion cells, the axons of which passed out of the eyeball, forming the optic nerve, which ran backward to the chiasm, where a marked rearrangement of the nerve fibers took place. From the chiasm these same neurons were carried back, forming the optic tracts, the fibers of which were distributed to the pulvinar, the external geniculate, and the anterior pair of the corpora quadrigemina, and ended there.

There was no continuity of tissue between the termination of the fibers of the optic nerve in the pulvinar and the parts that lay behind. A fourth series of neurons lay in the pulvinar and external geniculate, and a few in the anterior pair of the quadrigemina. The axons of this fourth series of neurons ran backward, forming a large tract or bundle which lay in the white matter of the occipital lobe. This bundle was called the optic radiation, the fibers of which were distributed to the mesial surface of the occipital lobe around the calcarine fissure, and to the angular gyrus of the parietal lobe, which arched around the postterminal extremity to the superior temporal sulcus. The letter and word centers lay in the cuneus, which lay superior to the calcarine fissure. The center for figures lay in the angular gyrus.

As the essayist had stated, there were two classes of fibers in the optic radiations which carried impulses to and from the cerebral cortex. But he was of the opinion that these had nothing to do with the light reflex for the pupil. The fibers that carried the reflex for the pupil left the optic tract before the visual fibers reached the pulvinar and the genicular, and passed downward to the third nucleus, and from this nucleus the fibers were carried to the sphincter pupillae. This formed the true and only pupil reflex arc of the higher vertebræs.

Dr. M. Z. Albro said that two years ago, a prominent physician in the city had a hemianopsia in the right field, and in taking his vision he was interested in the fact that he could not recognize letters, but in watching him he found him looking at the chart and making the form of a letter with his finger and then pronouncing the letter. This might give an idea of another road by which he reached the right recognition.

Dr. Michael Goldenburg asked if it was possible to have a unilateral loss of recognition of letters.

Dr. Suker, in closing, said that the primitive function of the eye was the nerve perception of light. All other recognition was developmental and the result of education, and was due to the associated fibers around the cuneus, the gyrus and the occipitoparietal lobes. There was no such thing as a unilateral recognition of letters until there was complete blindness in one eye. A unilateral inability to recognize a letter could not exist when both eyes

could function, because it was a cortical lesion and the cortex had association fibers because of the claustrum joining the two eyes, as Dr. Burkholder had said.

Regarding the pupillary reaction fibers and the optic nerve, the median tract of the optic nerve is the motor portion, and that goes to the anterior corpus quadrigeminum, from there to the nucleus of the third nerve, then to the lenticular nucleus and then to the ciliary body and iris. They have no function of sight, just a motor function, and this is true of all the lower animals, whether there is complete decussation or not. The field is larger on the nasal than on the temporal side.

Anatomically the eye is located a little divergent in the socket, bringing the nasal side a little farther forward, and therefore, a little divergent. It had been demonstrated very well by Schaefer and Sanger Brown, that there was an association between the cuneus, the pulvinar, the geniculate body and the optic thalamus. Otherwise there could not be the field symmetry in the two eyes. Coming back to the chiasm, there could not be any lesion without involving the two eyes. This is the crux of the whole question, and the nearer one got to the crus of the chiasm the more likely was there to be the type of lesion which could involve one eye more than the other.

ROBERT VON DER HEYDT,
Corresponding Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

DR. HILLIARD WOOD, President.

March 20, 1922.

Melanosis of Cornea.

DR. HERSCHEL EZELL reported the case of C. H. S., aet. 60, male, who consulted him February 20, 1922, on account of poor vision. There was a burning feeling about the eyes with ocular tire and headache. He had been near sighted since childhood, and had worn the last pair of glasses fifteen years. The patient had been under an enormous strain for years, getting but little rest, and at all times working under great pressure. The patient is a bookkeeper and clerk. Health has been good, except he has had most of the diseases of childhood.

Fig. 1.—Melanosis of cornea. Ezell's case.

Conjunctivitis of right eye, which cleared up in three days after using boric acid solution. The corneæ of both eyes present areas of pigmentation, running vertically thru their centers. The pigmentation is most dense opposite the pupils, but traverses the diameter of the cornea. To the right and left of the pigmentation the cornea is clear. The pupils are normal in size and react equally and freely to light and convergence stimuli. Ophthalmoscope shows fundi normal, except the myopia. Visual fields slightly contracted above and below. Color sense normal. R.—14.00 D. S V.=

20/70. L.—15.00 D. S. V.=20/70. To this correction +4.00 D. Sph. was added for reading. See Fig. 1, p. 663.

From the history and the physical findings, there is every reason to believe that this is a case of congenital melanosis of the cornea. The accompanying drawing is a good reproduction of the condition.

Melanosis of the cornea, or pigmentation of the cornea, is either congenital or acquired. The form and location of the pigmented area is quite different in the two types. If the condition is congenital, the pigmentation appears in the form of a vertically oval area of brownish color, affecting the deepest layers of the middle portion of the cornea. The cornea looks as tho it had been painted with brown or black paint vertically thru its central part. The condition is usually symmetric in both eyes. It is more common in women than in men.

In acquired melanosis, the pigmentation does not assume any special form. The cornea may be pigmented in a small area, or entirely covered. The posterior endothelial layer may be pigmented, or the pigment may penetrate into the substance of the cornea.

Congenital melanosis is due to an abnormal development of the uveal tract. Some authors attribute it to multiple sclerosis, as it has been observed in several such cases. Salus attributes the condition to this cause. "Senn, commenting upon a case that was reported by Salus, calls attention to the fact that the patient was a dyer, and referred to an article which he himself published in 1897, describing eighteen cases occurring in dyers using anilin colors, in which the cornea was stained a sepia brown."

According to Yamaguchi, primary melanosis of the cornea is very rare, and so far has not been examined microscopically.

He gives a microscopic description of two pig eyes, which exhibited an intense pigmentation of the central portion of the cornea. "The pigment was exclusively localized in the epithelial layer, chiefly in the basal cells. He assumes a metabolic formation of pigment from the albuminoid bodies of the cells, since by the negative reaction to iron, the hematogenous origin of the pigment could be excluded. The corneal epithelium acquired exceptionally the specific faculty of the cells to produce and accumulate pigment, which is congenitally inherent in the epithelium of the limbus."

In acquired melanosis, a prolapsed anterior chamber, wrinkling or folding of Descemet's membrane, or loss of endothelium, are predisposing factors. It may develop when the anterior chamber has been emptied for a long while, and the iris remains in contact with the cornea. The iridic pigment is then deposited upon the posterior surface of the cornea. Pigmentation has been noted upon the posterior surface of the cornea following operations, in which cases the pigment was found near the scars. Oeller has observed this and thinks that it comes from the iris, and that its deposition is due to the direction of the flow of the lymph current toward the wound until it heals.

A case of corneal pigmentation has been reported by Wells, which was due to hemorrhage into the anterior chamber following sclerotomy for secondary glaucoma. The color was at first greenish, but turned gray at the end of a year. After three years the eye was enucleated and examined microscopically, showing pigmentation in the anterior fifth of the corneal stroma. Rounded bodies were found somewhat larger than bacteria, which stained with eosin. Staining of the cornea has also been noted following iridocyclitis, chronic cyclitis, and detachment of the retina.

Trauma seems to be a very frequent cause of corneal pigmentation. Cases have been reported by Cantonnet, Jacub and others. The case reported by Cantonnet did not show pigmentation in the periphery, which is the rule. Sauvineau, in discussing this case, suggested that the bleeding from the ciliary body may have pressed the root of the iris forward against the cornea, and so prevented staining the cornea at this point.

Chemicals, viz., anilin dyes, silver nitrat, ochre and argyrol, are respons-

ible for a great many cases of corneal pigmentation. Among 106 self inflicted injuries to the eye done to escape conscription, Wasiutinsky saw 44 cases of artificial coloring of the cornea. By experimenting upon animals with a large number of chemicals, he concluded that only silver nitrat and ochre left such spots. Higgins reports a case in which argyrol was used following an incised wound of the cornea, which produced a brown stain, which was visible six months later. Sodium chlorid should not be used to neutralize silver nitrat, as it is liable to cause a deposit of silver salt. (Marquez.) The same author recommends the use of a 5% solution of sodium hyposulphit to remove such deposits.

1. From a review of the literature it is manifest that primary melanosis of the cornea is rare. 2. That hemorrhage is by far the most common cause of acquired melanosis. 3. The case herein reported is the first case on record accompanying a high degree of myopia, so far as he is able to determine.

Bilateral Traumatic Dislocation of Lens.

Dr. E. B. Cayce presented the case of Mr. L. P. S., aet. 46, farmer, who since early life had been myopic, but with —13.00 D.S. for each eye, had fair vision, both for distance and near.

November 28, 1921, he was struck above the eyes by a fist; both eyes were bruised. For a while he was almost blind, but recovered some vision in a few days. First seen January 26, 1922. At that time the right eye showed perception of hand movements at two feet; and the left eye was able to count fingers at twelve inches. In each eye, at the upper corneoscleral junction, was a mass of bulging scar tissue, as if an incision at the upper corneoscleral junction had been made, and the wound was bulging forward. The pupil of each eye was displaced upward, having the appearance as if an iridectomy had been done above. Each lens was dislocated forward and upward, one edge of the lens projecting forward thru the pupil, and the other edge projecting backward; the plane of the lens being more or less horizontal, and pushing the upper portion of the iris upward against the inner side of the corneoscleral wound.

Dr. Cayce decided the wisest course to pursue was to deliver the lens in the right eye, before attempting any surgical procedure in the left, or better eye. January 28, after the method of Fox, with incision well forward into the cornea, the lens was removed with very slight loss of vitreous. Healing was uneventful. At the present time, with +11.00 D. Sph., right eye has vision of 20/200, and with added correction for near work, vision is Jaeger No. 7. The scar tissue in the upper corneal region is slowly clearing up, and as the corneal curvature assumes more and more its normal shape, it is hoped the vision will still further improve. As the pupil is displaced upward, the lower margin of the iris obstructing central vision, Dr. Cayce contemplates doing an operation as suggested by Ziegler, i. e., make a window in the iris to give central vision.

Dr. Cayce said that while the patient was perfectly willing to have both lenses removed, yet he thought best to first operate on the worse eye, and see what degree of success could be obtained, before removing the opposite lens. The question in his mind is: With the degree of vision which the patient now has, should the lens be removed from the left eye?

Discussion.—Dr. Hilliard Wood inquired if there had been a rupture of the sclera above in each eye by the blow, at the upper corneoscleral margin; and if so, did this account for the appearance of the left eye, which looked as if it had had an iridectomy above. He thought the left lens should be removed. Inasmuch as Dr. Cayce removed the lens from the right eye, which was the worse eye, and improved the vision by so doing, he could see no reason why the vision of the left eye should not be improved in the same manner. Besides, if the lens is not removed, secondary glaucoma will likely develop later.

Dr. Cayce said that no operation whatever had been done on the left

eye, but remarked that it looked as if the blow had attempted to do a cataract operation. His idea was that the cornea had been ruptured and scar tissue formed. In his opinion the iris was not ruptured, but pressure of the lens had held it in position until it was atrophic.

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Wednesday, April 27, 1922.

Bitemporal Contraction of Visual Fields in Pregnancy.

PROF. C. E. FINLAY, Havana, Cuba. —On February 15, 1919, a case was sent to me in consultation, which gave rise to the investigations which form the subject of this paper.

Its Clinical History was as follows:

Mrs. E., aet. 24, in the 8th month of pregnancy, had suffered a month previously a severe attack of influenza. After recovery she had developed a series of seizures of a cataleptic nature, during which she could not move, tho perfectly conscious of what was going on around her. Examination of her eyes showed slight contraction of retinal arteries and dilatation of retinal veins. Visual acuity 20/20. Visual fields: temporal contraction (more pronounced on right side) for white, with marked concentric contraction for colors, the red field being larger than that for blue.

I concluded that there existed a hypophyseal compression of the chiasm, but was at a loss as to whether this was due to a hypophyseal tumor, or to an enlargement of this organ in connection with pregnancy, and as to whether the cataleptic seizures were due to the enlargement of the hypophysis or were of a hysteric nature. The seizures continued after confinement, and some of the experts who later saw the patient thought there was some endocrin disturbance with hysteric manifestations.

But the study of the case made me seek to determine whether the normal hypertrophy of the pituitary body which takes place in connection with pregnancy was of such a degree as to determine changes in the visual fields. I examined the visual fields of 31 women awaiting confinement, selecting only cases that presented no general complications, with normal eyegrounds and perfect visual acuity.

From an examination of these visual fields, we find that only 9 could be considered approximately normal, the remainder showing changes in the nature of a temporal contraction; of these 8 were slight, 9 moderate and 5 pronounced.

These surprising results lead me to a thoro study of the literature at hand, in connection with the anatomic and other data requisite for a complete explanation. For a time I was under the impression that my observations were the only ones made in this connection, but I discovered that changes in the visual fields of a similar nature to those which I have recorded have been published first by Bellinzona and Tridondani, and later confirmed by Forti, which they all attributed to dynamic or vasomotor disturbances similar to those occurring in hysteria.

This more or less forced explanation seems to me unnecessary, as the changes described can be perfectly explained by the mechanical pressure brought to bear on the chiasm by the enlarged pituitary gland, resulting from the normal hypertrophy of this organ which occurs in pregnancy. The gland increases 2 to 3 times its weight and volume during this state, this being due to an increase in number of oxyphil cells in the "pars anterior," a good many of the disturbances occurring in connection with pregnancy being probably due to the corresponding hyperfunction. The differences in the degree of the changes in the visual fields depend on the degree of hypertrophy and on anatomic peculiarities,

which may favor or hinder the above mentioned compression.

In conclusion I consider I can establish: That during pregnancy there often occurs, as a result of the normal hypertrophy of the pituitary gland in connection with this state, a compression of the chiasm which manifests itself by changes in the visual fields in the nature of a bitemporal contraction, which varies in degree according to the amount of compression suffered, this depending on the corresponding amount of hypertrophy and on the anatomic peculiarities of the case, which may favor or hinder this compression.

Psychopathology in Ophthalmic Practice.

CHARLES F. HARFORD, M.D., Cambridge.—There is a new field of medical research, rightly claiming close attention at the present time, which is destined to influence every branch of medical study; and that is the rapidly developing science of psychopathology. No department is more likely to be affected by this than that of ophthalmology. Ophthalmic conditions often form an exciting factor in the onset of the psychoneuroses, and there are physical elements complicating most ophthalmic diseases. During the war, when acting as an ophthalmologist in connection with a British Division composed very largely of miners, I was for the first time brought in contact with the ailment most unfortunately named miners' nystagmus. I prepared a paper on this subject, with the title: Visual Neuroses of Miners in Their Relation to Military Service. I pointed out that nystagmus was only one of a series of symptoms in the disease, and drew attention to the great importance of the mental factor, and the possibility that these cases might be treated by suggestion.

At the Ophthalmological Congress in London in May, 1921, I expressed my conviction as to the importance of knowledge of modern psychologic teaching in ophthalmic work.

The application of the new psychology to ophthalmic practice will only gradually be realized; but it is hoped that the suggestions which have been made as the methods of mind wording may help many to interpret some of the difficulties occurring in their practice.

In certain cases psychopathology and ophthalmology meet. Most of these include some measure of dissociation in which repression with amnesia will have a part, and in which, often in proportion to the amnesia, there will be some emotional distress. In all of these it is probable that an unconscious motive can be detected, and the demonstration of this may lead to the resolving of the conflict, the restoration of harmony, and relief from the distress.

We shall consider these cases in three main classes.

1. The psychopathology of every day life.

This admirable phrase, used by Freud as the title of a volume, will form a good introduction to our subject. It is a mistake to regard all psychic disturbances as conditions which can only be dealt with by specialists in psychotherapy. The truth is that there is a psychic element in every malady, and that whether we know it or not we must deal with it if we are to help our patients. Every practical physician or surgeon recognises this, tho perhaps unconsciously; and an older generation with its stress on temperament anticipated much that is being taught in a new way to-day. The manner of the older practitioner was studied more closely perhaps than manner is studied at the present time, and the confident assurance of success in treatment can only be regarded as a method of suggestion. To-day we approach these problems with new light. In our ophthalmic clinics, public or private, patients come to us, not so much because they know of any distinct disability, as because they are anxious about themselves.

Mysterious pains in the eyes or head, floating bodies or clouds before the eyes, unusual appearances about the eyes or lids are often regarded as threatening disaster, perhaps blindness. In many cases the anticipation of evil is more serious than any actual dis-

ease, and may even produce illness; and in some this foreboding is the only trouble with which we may have to deal.

Obviously our duty is to eliminate any organic disease or cause for trouble, including particularly the correction of refractive errors. We must further seek to convince our patient, by our methods and manner, that we are genuinely concerned in delivering him from his fears, whether real or, as we may style them, imaginary. Only thus can we obtain that true "rapport" which must exist between doctor and patient if success is to be ensured. This gained, we may by simple persuasion be able to clear away the fear and suffering which may still exist, not because the patient is intentionally exaggerating his symptoms, but because of some unconscious prejudice or habit, which is responsible for the trouble. It is useless to treat these cases by stern rebukes or ridicule, however veiled. Action of this kind will only develop resistances which may result in troublesome repression, with an intensification of the malady.

Let us take an example from the common experience of a refractionist. The prejudice against glasses is often very great. In the poorer districts of London, and no doubt elsewhere, those who wear glasses are called goggle-eyed, or some similar nickname is given to them. During the war, soldiers were greatly prejudiced against glasses because the Army glasses were round instead of oval, as they are most commonly supplied in England. Many girls prefer to endure any amount of suffering rather than wear any form of glasses which may not be regarded as becoming.

The result of this is the development of an unconscious motive which shows itself in an unwillingness to give a correct history, in mistakes in reading test types, and later on in difficulty with glasses. These patients have come to us for some real complaint and a desire for relief from their troubles, but when they are brought face to face with the remedy they shirk the issue. They may be said to regress, to prefer phantasy to reality, in a word they act like children.

2. Psychic disorders of pronounced form associated with visual disturbances.

There is a second class of cases of a definite psychopathic character, which may vary from the persistent headache to the more pronounced forms of psychic troubles. The nomenclature of these conditions, which includes such terms as hysteria and neurasthenia, is likely to be misleading, so we will not here attempt any definite classification.

It will be sufficient to mention some of the symptoms common to many of these conditions. Headache, minor obsessions or delusions, often visual, tremors of various kinds, disorders of the circulatory, respiratory or glandular systems of the body may be met with. Fatigue, inability to concentrate on mental work, varieties of amnesia, insomnia and phobias of a distressing type may all occur.

Ophthalmologists have long been aware of the importance of correcting errors of refraction in cases of this kind, but with new knowledge much better results may be anticipated. There are undoubtedly cases which call for comprehensive treatment, and should be dealt with by a psychotherapist; but many of them will first consult an ophthalmologist, owing to the prominence of symptoms referable to the eye, and the importance of being able to diagnose the condition is evident.

To take an instance from my own practice. A patient consulted me on account of symptoms which had shown themselves a few weeks previously, on the occasion of the last eclipse of the sun. He had looked at the sun without proper safeguards and he believed that his eyes had been injured thereby.

He had some conjunctivitis and some slight astigmatism, and both of these conditions were dealt with. There was no sign of any retinal lesions and no scotoma or interference with his color perception. It seemed clear that his main trouble was psychic, and this was confirmed later

when, as the result of some slight exposure to glare, he was affected in the same way in spite of wearing Crookes' glasses, and was obliged to give up his work. His own medical attendant who was a writer on psychologic subjects, formed the same view of his case, and a course of psychotherapy was advised.

This is a common incident in ophthalmic practice, and it is important that it should be recognized, so that it may be appropriately treated. Any attempt to deal with such cases by simply assuring them that there is nothing the matter with them, without recognizing the psychologic aspect, may even intensify the mischief. Here again we see that ophthalmology occupies a central position, with the added responsibility which arises in consequence.

3. Pronounced cases of mental disease.

In the class of cases which would be certifiable by British law, the ophthalmologist is not likely to be concerned, except to deal with incidental defects which call for attention. Seeing, however, that the major psychic diseases are usually a development from the minor, it may be possible to prevent the graver forms of disorder by a careful recognition of the premonitory symptoms.

Since visual obsessions are a common element in these cases, it may be of value to inquire into their possible origin. I was recently asked to see a patient who was in a state of marked dissociation, with visual delusions. She stated she could see moving objects in the dark corners of the room, taking certain definite shapes. The purpose for which I was consulted was on account of defective vision, and the possibility of prescribing more suitable glasses. I found that she was developing opacities in the lens, which were mainly in the form of minute dots scattered thruout the lens. I am of the opinion that these early disturbances of vision due to incipient cataract are quite sufficient to form imperfect images, which may gradually materialize into a concept of defined objects, human or otherwise.

Possibilities of the development of serious psychic conditions in connection with cataract and in other cases of opacities in the media, should be carefully considered. The experience of ophthalmologists as to the relation between the cataract and psychic disorders might be a valuable contribution to psychologic medicine. In a case of cataract which was under my care and operated upon by a colleague of mine, the following points may be noted.

Previous to the onset of cataract, there were some psychic difficulties with prejudices and suspicions, which were evidently morbid. These were accentuated by other physical infirmities including deafness, and with the onset of cataract these were much increased. In spite of this mental condition, and indeed with the hope of relieving in some measure these symptoms, and in any case bringing some relief to a condition of pitiable discomfort, it was decided to operate. The change in a monotonous life, of removal to a nursing home with devoted nursing, had a great effect upon the patient. The operation was most successful; and tho, as the result of starting up in the night two days after the operation, a prolapse of the iris occured, recovery was satisfactory. During the after treatment her whole outlook on life seemed to change, and the improvement was most gratifying.

Glaucoma again is a disease in which the severity of the pain and the rapid interference with sight is likely to lead to serious forms of phobia. It is worthy of inquiry in these cases as to the possibility of the psychic attitude complicating the physical malady.

Operation for Strabismus.

Dr. Castresana, Madrid, Spain. Tenotomy alone is not to be recommended. For convergent strabismus it is uncertain and variable in its results, and should be abandoned except for rare cases. It is likely to produce retraction of the plica semilunaris and caruncle, secondary deviations, muscular paresis and difficulties of binocular vision. Muscular advancement with stripping of the muscle, as practiced unilaterally by some authors, is insufficient for the majority of squints if not combined

with tenotomy, and suffers from the defects of the latter when so combined.

Double muscular advancement alone, with the resection of the central fibers of the tendon, associated with a "rhomboidal suture," and combined with a weakening of the antagonist muscle when the deviation is marked, seems to be the ideal treatment for strabismus.

The "rhomboidal suture" is placed thus: It is passed from without inward thru the conjunctiva and tendon, near the upper edge of the latter. Near the line where the cut ends of the tendon are to be brought together, the suture is dipped into the sclera, passing forward and upward; and brought out higher than the edge of the tendon. It is then dipped into the sclera forward and downward, again brought to the surface, level with its original point of entering the sclera, and is carried thru the insertion of the tendon and overlying conjunctiva. A similar suture is placed at the lower margin of the tendon, the oblique parts of the two forming sides of a rhomboidal figure. Such sutures prevent the narrowing of the tendon.

Low degrees of strabismus are corrected by the double indirect advancement, with very little resection and the "rhomboidal suture." The higher degrees are met by a proportionate resection of greater extent and a weakening of the antagonist. By this treatment the esthetic result at first obtained persists and improves with time. The muscular equilibrium is reestablished, which does not usually occur with other procedures. The excursions of the eyeball gradually become normal, binocular vision is reestablished where possible, and improvement of visual acuity may occur. Patients must wear their correcting lenses, and may require orthoptic treatments as supplementary to the operative procedure.

A New Excision Method of Pterygium Operation.

Dr. E. Campodonico Lima, Peru. Pterygium is of frequent occurrence in the tropics as compared with its relative rarity in the temperate regions. In the coastal zone of Peru, it is especially prevalent, owing to the dusty condition of the air, consequent on the dryness of the soil and the lack of rainfall.

In the United States I have seen few operations for pterygium; whereas, in Peru it is an operation of almost daily occurrence. In the following exposition I beg to outline a procedure which has given me the best results for a period already over twenty years.

The instruments needed are: lid speculum, small fixation forceps preferably one toothed, angular keratome, straight or curved fine scissors, fine silk suture, and occasionally a needleholder. The operation is performed in three steps: (a) dissection of the pterygium's head out of the cornea and adjacent sclera by means of the angular keratome; (b) excision of the pterygium's head and body by means of small scissors, (c) suturing of the flaps.

I have nothing to say about the first and second steps, as the performance thereof is a matter of routine practice. I should insist upon the use of the anesthetic by instillation, not by subconjunctival injection, as the areolar infiltration resulting from the injection is detrimental to the accurate subsequent coaptation of the flaps.

The third step i. e. suturing, is the one wherewith I shall deal with some detail, on account of the decisive influence on the outcome and ultimate issue of the whole operation. The placing of the conjunctival suture and cicatrix in a position favorable for recurrence is the paramount disadvantage of most of the methods in vogue for the extirpation of pterygium. The safest plan is to remove such conjunctival union from exposure in the palpebral fissure, as by so doing, in the excision operation, we actually lessen the proclivity to recurrence. Our method consists in suturing the middle of the conjunctiva below the point excised to the episcleral tissue and conjunctiva of the limbus above the point excised. If there is gaping of the two edges of the incision these are drawn together with a second suture.

Occasionally and especially in cases when the pterygium's head is large,

it is advisable to undermine a little of the lower flap to avoid the stretching on this flap when anchored to the upper.

On drawing the flaps together, overlapping of a portion of the cornea may result; this, however, is quite uneventful, and on taking off the bandage in a couple of days time, everything will be found in a perfect coaptation.

Instead of making the lower flap movable and the upper one fixed, we may just as well do the reverse and anchor a loose point of the upper flap to the episcleral tissue and limbus conjunctiva of the lower. This we have done several times, namely in cases in which it is easier to loose and slide the upper flap than the lower. We prefer, however, the first way because the conjunctival seam is thus more efficiently protected by the agency of the upper lid from exposure. At the end of the operation, it will be found also that fibers which had before a horizontal direction now have a vertical one; their natural trend of growing is consequently thwarted.

A still further advantage in removing the conjunctival apposition line from the horizontal meridian is the fact that by so doing we eliminate in the horizontal line the presence of sutures, which undoubtedly act as a stimulus for reproduction of connective and fibrous cicatricial tissue just exactly in a place where it is least desirable.

The eye is bandaged for seven or eight days, after which the sutures are removed. The bandage is changed every other day. Whenever possible, it is a good plan to keep both eyes bandaged at least for a couple of days.

I have operated on hundreds of cases by the procedure just described, and have eagerly and abundantly tried every new method that reached my acquaintance, with the result that I always gave it up to return to the simple course I have outlined above.

The Subconjunctival Excision of Pterygium.

Dr. S. Lewis Ziegler, Philadelphia. That pterygium is a vascularized, fleshy growth of conjunctiva invading the cornea and composed chiefly of *hypertrophied subconjunctival tissue*, is a pathologic fact which is highly significant in its relation to both treatment and prognosis.

It should always be removed when it is progressive, when it interferes with vision, when it limits ocular motility, when a capital operation on the globe is planned, or when it is disfiguring.

The requisites to success are (1) thoro removal of the head, leaving clear corneal tissue, (2) careful excision of the subconjunctival tissue, especially about the limbus, (3) complete closure of the conjunctival wound, with close approximation to the limbus (4) the avoidance of conjunctival tearing and tension, (5) rapid primary union, with as thin a conjunctival flap as it is possible to secure.

Accepting the theory that subconjunctival hypertrophy is more or less cicatricial in character and possesses, therefore, a persistent tendency to undergo contraction, and that it is this tissue which invades the cornea and causes recurrence, I conceived the idea that the thoro removal of this subconjunctival tissue would not only encourage smooth healing, but would eliminate the danger of recurrence. Acting on this theory, I began in 1890 to practice the following simplified method of subconjunctival excision, which in my hands has proved to be not only a cosmetic success but has prevented recurrence.

Cocain is sufficient as an anesthetic, and adrenalin may be instilled as a hemostatic. If desired a stronger solution of cocain (20%) can be applied directly to the growth with an applicator, while the lids are held open to avoid contact with the cornea.

First stage:—The neck of the pterygium is grasped firmly with rat tooth fixation forceps, drawn tense, and the marginal fibers of the head freely divided with the back and point of a Beer's knife, used as a dull dissector. If the apex is unusually adherent, the knife may be passed beneath the neck and the head shaved off.

Second stage:—Still grasping the apex with forceps and holding it tense, both

sides of the pterygium are cut loose with the conjunctival scissors and the flap lifted up.

Third stage:—The forceps which grasp the apex are now handed to an assistant, who continues to hold the flap taut, while the *subconjunctival tissue beneath the flap* is grasped by a second pair of forceps and carefully dissected off from the conjunctiva by delicate snips of the sharp pointed conjunctival scissors. When the conjunctival flap is freed from the underlying tissue its apex is excised, and the remaining flap of pure conjunctiva dropped back toward the canthus.

Fourth stage:—According to the size of the scleral defect to be covered, I resort to one of three different procedures.

(a) *If the pterygium is small* the conjunctival wound is closed by two sutures, which may cause overlapping of the corneal margin. This overlapping is corrected by clipping the cuff like roll of conjunctiva in several places with scissors and pushing it back. As the conjunctiva again smooths out, these "pie-cuts" open into small diamond shaped perforations which relieve all tension and heal smoothly.

(b) *If the wound is larger and the conjunctival tension is great,* two short paracorneal incisions (5 mm.) are made, above and below, the conjunctival edges undermined and the wound united by two sutures, or

(c) *If the denuded area is extremely large,* two sets of liberating incisions are made, the paracorneal incisions above and below being supplemented by incisions made parallel to the first (5 to 10 mm.) and placed at the canthal extremity of the wound. The quadrilateral flaps thus formed are closed with two sutures and an anchor suture placed at the intersection as in Knapp's double transplantation.

As a rule, the simple technic of the first procedure (a) is wholly adequate to close the wound. Healing is smooth and prompt, owing to the avoidance of extensive dissection and the freedom from tension. A monocular dressing is applied for three or four days. The Liebreich patch may be worn a day or two longer. The stitches can be removed on the third or fourth day. Boric acid irrigation is used once daily until the pad is discarded, then three times a day. The eye usually remains red for one or two weeks. If there is lacrimal disturbance, the duct should be dilated at least ten days before the pterygium operation is attempted.

The principle of subconjunctival excision of the hypertrophied or adventitious tissue can be applied as well to any other of the well known pterygium procedures. I have tried it in McReynold's modification of the technic of Desmarres, Sr., and found it successful in producing a much thinner flap, which made the procedure a greater success.

Ocular Tuberculosis in Children.

Dr. Francisco Poyales, Madrid, Spain. In the ocular pathology of the child, the chapter on tuberculosis seems to have been neglected, especially as to the anatomic-pathologic verification of lesions. In three cases in which it was necessary to practice enucleation on account of serious lesions and as a prophylactic of therapeutic measures, the histologic study of the eyeball gave material utilized to determine the tuberculous processes causing the grave conditions presented to clinical observation.

Primary tuberculosis of the ocular globe presents great difficulty in its clinical diagnosis; and may be confused with other inflammatory lesions of a chronic type not presenting definite symptoms for differential diagnosis. There may exist no manifestation of tuberculosis in other parts of the organism. There is also absence of family history, negative v. Pirquet reaction and no previous ocular disturbances.

The secondary manifestations frequently are presented by patients with intestinal or pulmonary tuberculosis. A family history exists, the positive v. Pirquet reaction shows a soil fertile for infection, and there may have been repeated attacks of pustular conjunctivitis. In this form the clinical diagnosis is more simple. In the human eye including different layers, it is possible to observe either simple forms of infection of these membranes or combinations. Whenever in a chronic

or acute process we obtain no improvement by common therapeutic means, and the investigation as to other types of infection is negative, we ought to think of a tuberculous lesion.

The eyeball attacked by tuberculosis is sometimes destroyed before infection from it becomes generalized; and it is possible to find progressive zones from the cheesy, more advanced lesions to those invading more resisting membranes. We cannot exclude the possibility of general infection if we bear in mind the bacillary migration thru the blood. But ocular localization is favored by the capillarity of the arterial and venous plexes. The bacilli which resist the attack of the polynuclear leucocytes are detained in the vessels by a fibrinous thrombus.

1. A boy nine years old. Diagnosis, sclerokeratitis with chronic iridocyclitis. No family history, Wassermann negative. v. Pirquet negative. Pain in the eye, ocular hypotension, vision zero. Presented no symptoms of tuberculosis in any part of the body, but evidence of malnutrition. There was no improvement under appropriate treatment. Tuberculosis was regarded as the probable cause, and the eye was enucleated.

2. A girl, aged 13, had suffered a blow on the right eye three years before. Diagnosis; secondary glaucoma, and hemorrhage into vitreous and anterior chamber. R. gradually lost vision without pain, and the eye became smaller; and had been entirely blind for one year. The father died of tuberculosis, there was negative Wassermann and positive v. Pirquet. No hemophilia, malnutrition. She suffered in childhood from white swelling of the knee. Now has intense pain. Acute glaucoma. With no light perception and possible presence of tumor, foreign body or chronic tuberculosis, the eye was removed as a prophylactic measure.

3. Tuberculous cyclitis with luxation of the crystalline lens into the anterior chamber in a girl 9 years old, with pulmonary lesions of tuberculosis. Great emaciation and negative Wassermann. She had suffered three years previously a blow on the left eye, and since then had gradually lost vision, until it was now completely useless. Severe pain in the eye for a week. Eye hard with severe glaucoma, no light perception, and lens in the anterior chamber. Enucleation was performed.

The diagnostic value of the v. Pirquet reaction varies with the type of infection. In the first case, primary tuberculous lesions without other manifestations in other parts of the organism, the result was negative.

In the other two cases, with tuberculous lesions in the eye and in other parts of the body, the result was positive. This seems to indicate that it has diagnostic value in cases of secondary ocular tuberculosis. But it ought to be used whenever one suspects a primary manifestation. A positive result may be of great value in determining the etiology.

We have proved that an isolated primary lesion may cause by propagation the extension of the tuberculous process to the whole eye, without having it invade the rest of the organism up to the time of the enucleation, as in the first case.

The second case is one of advanced tuberculosis localized in another part of the body. This case makes us think that ocular tuberculosis may present stages similar to those of pulmonary tuberculosis, the comparison made between hemoptysis and hemorrhage in the vitreous is perfectly reasonable.

Our preparations make us believe that the destructive process in the iris, ciliary body and choroid in its advanced development empty the contents of cavities into the vitreous or anterior chamber, clinically simulating hemorrhage. The third case has value in illustrating complications, the best known being detachment of the retina, when there exist tuberculous foci in the choroid.

The therapeutic problem includes, first; conservation of the visual acuity of the eye. We should endeavor to effect this at any cost, whether the lesion is primary or secondary. The appropriate local treatment should be supported by general measures.

Second; when tuberculization of the eyeball is so intense that vision is completely abolished by irreparable damage, the eye should be enucleated as a prophylactic and therapeutic measure.

SPECIAL REPORT

INDUSTRIAL DISEASES OF THE EYE.

At the recent Congress held by the Ophthalmological Society of the United Kingdom, an afternoon was set apart for the discussion of industrial diseases of the eye (excluding accidents, miners' nystagmus, and glass blowers' cataract).

Dr. T. M. Legge, (H. M. Inspector of Factories) opened the discussion from the administrative side. He spoke first of *conjunctivitis caused by hydrogen sulphid.* He saw, on one of his factory visits, a chemist with intractable conjunctivitis, specially marked in one eye. This man periodically applied the eye which was chiefly affected to a little peep hole where a process of manufacture was going on, and in doing so he lifted up a little piece of glass in order to see better into the chamber, and it was the resultant stream thru this aperature which kept up the inflammatory condition. He remembered, too, in the early days of the manufacture of sesquisulphid of phosphorus, that the life of a manager was made miserable by the small amount of hydrogen sulphid which was given off into the atmosphere when the sesquisulphid came into contact with moisture. This was not relieved until the whole process was carried on under a negative pressure.

He spoke chiefly on the *optic neuritis set up by lead poisoning.* He exhibited a carefully prepared chart showing the gradual decline of cases of this condition from the time when the instances numbered 1,200 in a year, to the present time, the fatal cases being shown in red. He separated the cases due to encephalopathy from those of optic neuritis uncomplicated by such manifestations as lead convulsions. He had also indicated those who were suffering from mania or mental hebitude. In the white lead industry, there had been a tremendous drop in the number of cases; there was also a large decrease in the paint and color industry. But there was no corresponding diminution to record in industries in which white lead was used, as in coach painting or ship building. Cases occurring in house painting were not compulsorily notifiable, and up to 1914—the industries were abnormal during the war—there was a steady increase in the number of cases occurring.

The diminution of the cases of optic neuritis due to lead in controlled industries was due to the fact, that in them an exhaustive system of ventilation by means of fans to take away the dust produced was in operation, whereas the dust caused by sandpapering the dry paint in coach painting could not be so carried away. The system of ventilation now in operation in the industries referred to did not depend on the workers' power of applying it or omitting to do so. Slides were shown illustrating the method in which this is carried out.

A factory which, just before the war was working for some country intensively on dinitro benzine, had 28 cases of poisoning by that substance, including 4 of amblyopia. During the Summer, owing to the volatility of the substance, a greater number of people were put on to work in night relays, and these cases occurred in a burst. When the shift was reduced to four hours, the conditions improved. Dr. Holmes, of Wigan, said he had never seen cases with such extreme contraction of the fields of vision.

During the war, T. N. T., which caused so much illness in the form of dermatitis and toxic jaundice, did not appear to have affected the optic nerve. Only two cases were brought to his notice, and in regard to these he had the reports of Dr. Patterson, of Edinburgh, who considered the weight of evidence favored their being due to tobacco, rather than to T. N. T. In reference to *tobacco amblyopia,* his colleague, Dr. Middleton, followed up the case of a woman, a nonsmoker, who for 25 years had been employed in the leaf room of a tobacco factory. About nine months before being seen, her vision commenced to be defective. Dr. Sym, of the Edinburgh Royal Infirmary, investigated the case, and he reported that it was a case of tobacco amblyopia. The woman had been exposed to finely divided tobacco dust

which was produced thru a fine meshed hand sieve.

Dr. Legge exhibited slides showing how, towards the end of the war, 12-inch shells were filled by means of movable flexible pipes, and the means used to carry away the fumes. He also exhibited slides showing how *anthrax* affected the eyelids. Before the use of antianthrax serum, the fatality of external anthrax—which was now normally 15 to 25%—was much worse when affecting the eyelid, especially the upper lid. At that time he considered that 40% to 45% of cases, when the upper eyelid was affected, would be fatal. Now, however, since the giving of the serum, in 80 c. c. doses intravenously, followed by 60 c. c. on the following day, the mortality of eyelid cases had been definitely reduced, so that the mortality in these cases was now much the same as in those where other parts of the body were involved. External anthrax seemed to be fatal in proportion to the degree of looseness of the cellular tissue at the site of infection; the eyelid was, of course, rich in such tissue. The slides shown were of different stages in eyelid infections.

Dr. Legge asked whether the increase in the long axis of the eyeball, constituting *myopia* could be regarded as an occupational disease. He commented on the comparatively little work which had been done on the subject of visual fatigue. Did the work, such as that of the compositor, cause myopia, or did that work merely cause special attention to be directed to a defect already there?

Mr. Bernard Cridland related his experiences in a large iron workers' district, and exhibited a table of cases with particulars and histories.

Professor Collis discussed the relationship between *visual acuity and vocational selection*. Employers were rapidly coming to see the disadvantages resulting from a worker and his work being ill mated; output was smaller when that was the case, and discontent was generated by seeing his fellow man earn more than he could earn himself; it accounted for men drifting from place to place in search for a congenial employment.

Behind the science of vocational selection lay the earlier science of vocational guidance, which should be in the hands of teachers and juvenile advisory committees, who, after ascertaining the capacity of each adolescent, should guide him in that walk of life wherein such capacity was needed and had scope. And no faculty had greater influence on capacity than that of vision, for as we saw, so did we react. Indeed, artistic appreciations must depend on visual acuity and the presence or absence of errors of refraction.

Visual acuity was definitely related to industrial efficiency; the need for good vision in the engine driver and the seaman had long been recognized, therefore there was surely need for the vision of all motor car drivers to be tested. Instances of the latter meeting with accidents were frequent, yet fining and endorsing the licenses seemed to sum up the resultant action, the men concerned being again let loose upon society. He knew of no case in which an offender had been referred to an ophthalmologist to have his sight tested. The Professor elaborated this theme by referring to personal experiences.

With regard to accidents, it had been concluded that 85% of all accidents were due not to absence of guards and safety appliances, but to such causes as negligence, carelessness, want of thought, and, most of all, to a lack of appreciation of danger. Greenwood had pointed out, as a result of statistical enquiry, that there was a varying individual susceptibility to accident; but no one had yet tried to connect such increased tendency with defective eyesight. Nevertheless, the relation between deficient illumination and accidents had been pointed out by Wilson and Patterson in this country, and by Simpson in the United States. The latter authority estimated that out of 91,000 accidents, 23.8% were due to imperfect illumination.

Innate imperfect visual acuity might be an important factor in determining individual susceptibility to accident; certainly muscular contraction was less accurate and more liable to error where vision was imperfect. Visual acuity must also affect industrial efficiency. He was not aware that anyone had ex-

amined the best and the worst workers in different processes to ascertain their respective visual acuity; yet not until this had been carried out could anything valuable be known of the visual needs for different occupations. There was a great tendency to look after the rare and unusual diseases, which, after all, were but as a drop in the ocean.

With regard to the effect of industries upon visual acuity, certain occupations did produce certain of the eye diseases. Miners' nystagmus (which had been ruled out of this discussion) was associated at one end with very low illumination, and at the other end were cases of cataract caused by excessive exposure of the eyes to heat rays from molten metal. But what was less clear was the effect produced by less pronounced exposure in the ordinary circumstances of work. A necessary preliminary was to know the visual acuity possessed by the general community of the same age as these workers; he knew of no such information, but it was much needed. The closest approximation was that of juveniles of school age, but this could not be applied to adults, especially those of middle age, the age when the effect of occupation was most pronounced.

It seemed clear that the human eye was never evolved for the purpose for which it was now so constantly used, and when so used it was found to be a more or less defective organ. How far this use acted injuriously required to be determined, so that acuity and occupation could be effectively mated. He pleaded for research upon the lines he had indicated, so that employers who needed people to work at various processes might know what standard of vision to look for in the people they might choose.

Mr. Healy referred particularly to *tin plate workers' cataract.* In this industry he had seen a type apart from the posterior polar variety, and one found the posterior polar variety associated with the cortical variety in the lower cortex. Whatever the cause of the posterior polar variety might be, it was probably also the cause of the broom like opacity in the lower and inner cortex. He did not think direct rays had much to do with it. He believed that heat rays were absorbed by the iris, and that owing to that continual absorption, an alteration occurred in the secreting endothelium, and in that way the aqueous was altered; it might lead to the increased formation of salts in the aqueous, and there might occur spreading along the ligament to the lens defects of epithelium, thereby admitting aqueous by osmosis into the lens substance, leading further to swelling of lens fibers, and in that way to the production of cataract. The cortical variety might possibly be produced by some alteration in the essential lymph channel which reached the posterior pole.

He agreed with those who said there should be further investigation as to the effect of manual labor upon the general bodily health. He had in mind the case of a man aged 41, a rollerman in a mill, who consulted him because of homonymous hemianopsia, which had come on suddenly. He retained central vision, but the condition never improved. No cause for that man's arteriosclerosis could be found; his blood pressure was 205 mm.; his Wassermann, done several times, was negative, and several good physicians failed to find any cause for his arteriosclerosis. Possibly men who were engaged in hot work such as this, and were constantly sweating and imbibing large quantities of fluid, might develop arteriosclerosis in consequence, and this might be an adjuvant factor in the production of cataract.

He had seen many cases of cataract among iron workers, and in them the results after operation were as good as in the general run of the population who had senile cataract.

Dr. Brinton (of Johannesburg) said that occasionally posterior polar cataract was encountered in gold smelters and assayers, who had to be constantly assaying small samples in crucibles. It was not included in the diseases for which compensation was recognised, but he had got the manager of a large mine to recognise it as a subject for payment. He had never yet encountered a case of cataract from heat in the native; possibly because the native had always been accustomed to considerable heat. H. Dickinson.

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RADIOGRAPHY OF FOREIGN BODIES IN THE EYE

The foreign bodies it is important to locate in the eyeball or orbit are generally small, and the majority of them are situated in the anterior part of the eye. They vary in the density of the shadow they throw on the X-ray plate, but all of them are more or less permeable to the rays, like the soft tissues in which they are imbedded. The great obstacles to getting good X-ray films or plates, of such bodies, have been the heavy shadows cast by the bony walls and margins of the orbit, and the mobility of the eyeball.

Many of the foreign bodies, to be searched for in this locality, cast shadows less dense than those of the orbital margin. Most of the work of discovering and locating these foreign bodies has been done on the supposition that the examination must be made with tubes and exposures that will cause the rays to penetrate even thick bony masses; and will leave no perceptible shadow from the soft tissues, in which the particles sought are situated, and their exact relation to which it is most important to find out.

Whenever it is possible to obtain a radiogram showing the soft parts, as the lids, lashes, profile of the cornea, etc., the foreign body will give a more distinct and noticeable shadow on it than on a plate obtained by an exposure that gives a lightening of the bony shadows and no visible shadow from the soft parts. Then, too, the picture which shows the soft parts is obtained by a shorter exposure; so that it is easier to avoid movements of the eyeball that might prevent a small foreign body from giving any distinct shadow

The difficulty in getting the more desirable short exposure picture is the difficulty of placing the plate or film, where it can receive the rays that have passed thru the eyeball without having to pass thru the bony walls of the skull. When the first cases of X-ray localization of foreign bodies in the living eyeball were reported to the American Ophthalmological Society, in 1896, Clark described a method of wrapping a piece of film in black paper and thrusting it up in the nose, on the side nearest the foreign body, where it would be reached by the rays thru the thin inner wall of the orbit; and he

presented negatives taken in this way from the cadaver, that showed very clearly thin metallic bodies in the orbit, well back of the eyeball.

Recently Vogt (see O. L. for March, v. 18, p. 9) has described a method of thrusting the sensitized film, properly wrapped, into the conjunctival sac adjoining the nose, or in the lower cul-desac; and placing the tube so that the rays will pass just anterior to the outer or upper margin of the orbit; thus getting negatives of great distinctness and delicacy, showing the anterior segment of the eyeball, and any foreign body it contains. Even foreign bodies that would cast no appreciable shadow, if the exposure had been sufficiently prolonged to lighten up the shadows cast by the thick bones of the skull, are shown clearly.

It has generally been thought important to get negatives that would show all the orbit and adjoining parts, so that, whether the foreign body had lodged in the eyeball or deeper parts of the orbit, its location would be revealed. But it is even more important to have a negative on which the foreign body has cast a perceptible shadow, no matter how small it is; and one on which its presence will not be concealed by the slightest movement of the eye.

It is not always understood how much of the eyeball is accessible for these more definite, delicate, and reliable X-ray pictures of the soft parts. Under local anesthesia a piece of film can be thrust into the nasal portion of the conjunctival sac, back to about the equator of the eyeball, in most eyes without serious discomfort; and in the average person more than half the eyeball is in front of the outer orbital margin. Among 4,500 patients, measured by the writer, the average protrusion of the apex of the cornea in front of the outer margin of the orbit was over 17 mm. It was over 16 mm. in front of the bone plus the soft parts. In many persons the protrusion is over 20 mm., and in some the whole eyeball is in advance of the temporal orbital margin.

Most X-ray specialists are accustomed to get X-ray plates of the orbit by exposures that penetrate the bony parts, so as to lighten their shadows. Such plates are necessary for many purposes. But to reveal small foreign bodies in the anterior portion of the eye, they are inferior to exposures that will leave the outlines of the soft parts visible and the bony shadows black and obscure. It may be necessary for the ophthalmologist to call the attention of his X-ray specialist to these facts, to get his best assistance in the detection of minute foreign bodies, which are usually found in the anterior parts of the eyeball. The insertion of a film into the nose, where the rays will have to penetrate only a thin lamina of bone, may demand the technical skill of the rhinologist. But it is certain that films obtained by these methods can be made to give most important evidence as to the presence and location of small foreign bodies. They should be included in any complete radiographic examination.

E. J.

THEORIES OF COLOR VISION

It is often noted that a long list of remedies for a certain condition, for instance trachoma, is good evidence that no thoroly effective remedy has been found. In the same way, the existence of a number of competing theories to account for a particular group of phenomena, may be taken as proof that no satisfactory theory has yet been promulgated. This is particularly true of theories of color vision. The theory of Young, patched up by Helmholtz, finds a rival but not a successor in the theory of Hering; and those of Ladd-Franklin and Edridge-Green struggle vainly to replace the older conceptions, and in competition with each other. Also, hypotheses like that of von Kries of a double function, one of light the other of color vision, still further complicate the situation and burden the memory.

A theory to account for physical phenomena, and still more, one to account for vital phenomena, serves somewhat the same purpose as a diagram used for illustration. It does not

present or take cognizance of all the details, like a photographic reproduction. It picks out certain facts that are deemed most important, and attempts to show their relations, or possible relations, in a way that will help in understanding and remembering them. A diagram may be of very temporary usefulness, drawn to illustrate a certain point and rubbed out a few minutes later; or it may be worthy of a permanent place in a book or in memory, as affording a good scheme on which to arrange important facts.

The same is true of a theory. Even "established theories" only explain and unite the known facts. How completely they may be rendered obsolete has been illustrated by the theory of fixed chemical elements, and the discovery of radium and the progressive alteration of this and allied "elements." The difficulty about color vision has been that some useful hypothetic suggestions have too often been repeated and discussed as "established theories;" so that they become obstacles and not helps to the understanding and remembering of facts. When theorizing gets beyond the known facts, it becomes idle speculation; and, however interesting it may be, it should have little place in scientific treatises or discussions.

The known facts are, that certain sensations spoken of as colors are associated with certain wave lengths, or vibration frequencies of light. But between the vibrations that reach the retina, and the sensations we perceive, and talk about, there is a gap, which it has been attempted to bridge with speculations and hypotheses. About the transformation of light into sensation or memory, or the nature of the process by which the retina influences the brain, or how much of this transformation is done in the retina and how much in the brain, we know very little.

The assumption of three or four kinds of substance in the retina to respond to particular wave lengths of light, or separate receiving segments of the rods or cones, each responding to a particular wave length, or different sets of nerve fibers to carry different impulses from the retina to the brain, cannot do away with the necessity for brain centers capable of differentiating between the various impulses sent in. The power of one segment to receive and one fiber to transmit different impulses, is just as easy to assume, is far simpler and is quite as much in harmony with what we know of the transmission of light, heat and electricity outside the body.

We know that the same wire transmits all sorts of electricity with equal readiness and certainty. The multiplex telegraph sends a dozen messages, both ways at once, over a single wire; the identity of the messages sent and received being secured by the sending and receiving apparatus independent of the wire. We know that vibrations come to us across space, measured only by light years, every vibration preserving its identity and reaching its destination prepared to make its perfectly characteristic impression. Why should we assume that this ability to transmit different impressions is not possessed by each nerve fiber that connects the retina with the visual cortex; or that the ability to discriminate between different impulses reaching it is not possessed by the brain cell thru which we become conscious of those impulses?

Young and Helmholtz lived before wireless telegraphy was worked out. Hering propounded his theory before the tuning of an instrument to receive any one of a great series of electromagnetic vibrations was understood; or the enormous multiplicity of vibrations, with which we are now familiar, was discovered. It is likely that speculations and hypotheses put out along other lines would be more helpful today, than are those still preserved for us in the text-books, like mummies in the tombs of Egypt. If we admit that nerve fibers and nerve cells have as varied powers of transmission and appropriate reaction as copper wire or glass, we can project our speculations and hypotheses along new lines.

E. J.

BOOK NOTICES

Methods of Studying the Functions of the Different Organs of the Body. Organs of Sense: Light Sense and the Eye. I. **Examination of the Eye in Red Free Light,** by **A. Vogt** of Basel. II. **Retinal Functions,** by **Adolf Basler** of Tübingen. III. **Methods of Representing Nystagmus,** by **H. J. L. Struycken,** of Breda. In the "Handbuch der biologischen Arbeitsmethoden," edited by Geh. Med. -Rat. Prof. Dr. Emil Abderhalden, Director of the Physiologic Institute of the University of Halle. a. d. Saale. Abt. V, Teil 6, Ht. 3, p. 365-462. Published by Urban and Schwarzenberg, Berlin and Vienna.

This book consists of 98 pages, with 70 illustrations, one of which is a colored drawing of retinal atrophy as seen with the red free light. The paper is of good quality and the printing is good. References are found either in the text or as foot notes, either of which, and especially the combination, is inferior to having them at the end of the article.

I. This part covers 14 pages, and is subdivided into three parts: (1) description of the apparatus employed, (2) technic of its use, and (3) the appearance of the fundus in red free light. Under ordinary illumination, there are two components of the light reflected from the fundus: one, the "retinal light," which is only slightly altered, and the other, the "choroidal light," which is colored red by the blood thru which it passes, and usually overshadows the "retinal light." By use of the red free light, however, the conditions are reversed, as the retina is converted into a more or less opaque medium, giving more reflection and showing up the more anterior layers of the retina better than the posterior. The macula is shown in its true yellow color, and its changes are made more manifest. Finer and more numerous blood vessels, hemorrhages, etc. are shown in the rest of the fundus, as well as the normal state and the pathologic appearances of the nerve fibers.

II. This part covers 76 pages, and is treated under the following headings:

I. Methods of examining the relation between vision and the retina.

Monocular visual field. (a) Defects and the blind spot. (b) Limits (examination with the perimeter.) (c) The macula: (1) general; (2) the macroscope; (3) entopic observations of the yellow spot. (2) The light perceiving retinal layer. (3) Mechanical irritation of the retina.

II. Methods of examining visual sensations without reference to their relation to the retina.

(1) Threshold determination. (a) Brightness threshold; (1) differential threshold; (2) absolute threshold; (3) method of estimating the smallest amount of energy necessary to stimulate the retina. (b) Time threshold. (c) Quantitative threshold.

(2) Duration of the sensation.

(3) Spatial sense. (a) Visual acuity. (b) Delicacy of the optic localising power. (c) Irradiation.

(4) Perception of movements. (a) Velocity threshold: (1) lower threshold; (2) upper threshold. (b) Methods of examining other facts of the perception of movement. (c) Quantitative threshold of movements: (1) minimizing the movement thru great distance from the eye; (2) mechanical minimizing; (3) optical minimizing. (d) Quantitative threshold of movement at the periphery of the visual field. (e) Brightness threshold, for movements. (f) Pseudomovements: (1) movement after images; (2) simultaneous pseudomovements.

(5) Blending of brightnesses. (a) Methods of blending. (b) Method of demonstrating Talbot's law.

(6) Blending of forms.

(7) Cinematographic sensations.

(8) Intermittent illumination.

Many of the above are of academic importance only, but many are of great practical importance.

III. The third part occupies 8 pages, and consists chiefly of a description of the method of photographing nystagmic movements.

C. L.

Manual of Diseases of the Eye. Charles H. May. Tenth edition, 1922. 377 illustrations, 440 pages. Published by William Wood and Co., New York. Price $3.00.

This book, undoubtedly the most popular of the smaller text-books on ophthalmology now appears in its tenth edition in 22 years. Its value is attested by its numerous editions as well as by the fact that it has been translated into German, Italian, French, Dutch, Spanish and Japanese, and a Chinese edition is now in press. The present American edition contains 440 pages, with 377 illustrations; of which 22 are plates, with 71 colored figures.

In a book of this size, naturally much must be omitted which the larger text-books supply in more detail; but this is a decided advantage to the student and general practitioner for whom the book is intended, who is likely to become confused by a multiplicity of descriptions. The operations are those which in the experience of the author have produced the best result. It would be advisable in the next edition for the author to mention some form of lid retractor for use in cataract operation, in addition to the self retaining speculum illustrated. Also the new anesthetic, butyn, and parenteral injection of milk, which is enjoying such popularity, especially in Germany, should be mentioned. The book will undoubtedly be received with the same approval which has greeted its predecessors.

C. L.

CORRESPONDENCE

Ophthalmic Meteors.

To the Editor:—In the broad expanse of the heavens to which the term firmament is applied, there are countless celestial bodies. Some there are like the sun and the moon, that have definite functions in connection with our own terrestrial sphere; others are there, whose uses are doubtless important but unknown to us, but seemingly their decorative value is the greatest. Still others loom up in our visual field from time to time, dash across the sky with reckless speed attracting the attention of everyone, lay and professional alike, and pass out of sight into the yawning chasm of oblivion to be heard of no more.

Our ophthalmic firmament also has definite substantial bodies with uses so valuable and well known as to suffer depreciation by becoming commonplace, while the spectacular features of the meteoric bodies that come to view from time to time, detract attention from the old reliable and steadfast.

The comparison is not so inapt when we recall the visits of the missionaries of ophthalmic progress that have come to our shores in the past year or two. Out of the Far East—out of India—from towns with names, the very sound of which brings to our minds the luxurious era of the Grand Moguls, and the gorgeous trappings of the Maharajahs, have come two exponents of new kinds of ophthalmic operations—Elliot and Smith. From all over the world have come searchers after ophthalmic truth to the clinics of these master surgeons, and carried back to the remote villages from whence they came, tales of the prowess of these worthy men.

Heralded by his wonderful success and welcomed by his countless friends, Elliot, personally, proceeded to carry the mission into the very heart of the wilderness country, from the fishing hamlets on the Atlantic Coast to the trading posts on the western slope of the Rocky mountains, until scleral trephining became an ordinary procedure that no one hesitated to do. The mission was a success. The converts were many.

But as the luminosity of this star begins to wane, another is sighted. This time the mighty Smith—Smith of India—genial, lovable, generous and considerate, as all his pupils testify, engages our attention. The Indian method of extraction of cataract in the capsule, long since familiar to us thru the efforts of the advance guard of the real prophet, now comes to us for demonstration of the way the master does it, and strange to say, not at all the way his precursors have demonstrated

it. We hold our breath at the very audacity of the operation, but our attention is divided among the several features of the technic, and the personality of the operator, of which we were previously in complete ignorance. From the domain of the sacred codfish to the humble huts of Hollywood, the intracapsular way is shown to the multitude. The dissenters are completely overcome and thrust aside. The new era is complete.

But as the sun sinks in the west at close of day, and the moon rises to rule the night, so with the passing of one comes the appearance of a still newer one. The Peacock throne, the Durbar, the Holy City of Benares, the Black Hole of Calcutta, and the other countless thoughts of India that have surged thru our brains as we met and talked with these men, are to be replaced with visions of bull fight, matadores, toreadors, Spanish opera, Alhambra and others, as the good ship bearing Barraquer of Barcelona, Spain nears our shores.

Pleasing in personality, modest, graceful in the guidance of a delicate but powerful force in the suction operation for cataract, Barraquer rises to the same eminence in our community as his Anglo-Indian colleagues. With open mouth we gape in amazement at the possibilities this method suggests, but confine our thoughts only to its possibilities in skillful hands. Our profession in this country is enriched by this contact with the work of this land of romance and passion. Wonderful as this method might be, the shyness of its exponent is responsible for its lack of notoriety. But the man and his method attained the same heights as his predecessors.

But here again the glories of one star are but of passing moment, and the already new must give way to another. Our learned and esteemed teacher Ernst Fuchs follows in due season, but here our analogy must admit of considerable cutting and fitting. While bringing to our mind such new and valuable points that have survived the recent parlous times in his home country, like the older and more familiar sun and moon, he brings to us a note of conservatism, to which we most heartily subscribe.

We can, and do, get a measure of success from scleral trephining in glaucoma, but we do not get the same high percentage of dependable results as we do from broad iridectomy, Fuchs says the trephine openings heal up, something certainly happens to them, if the patient has a true glaucoma. A healthy eye without glaucoma would give an ideal result—if that is the kind of ophthalmology you desire to practice.

The Smith operation is certainly desirable under the undesirable conditions prevalent in India. Here we must obtain good vision in order to consider any operation successful, and with Fuchs we heartily agree that there is as yet no valid objection to the perfected operation with iridectomy, cystotomy, and if need be, secondary needling in the hands of a skilled surgeon. The bungler will have trouble with any operation, but if a man equally skilled in both operations leans with preference towards one, then that operation on its own merits alone, may be considered to be the better of the two.

The Barraquer suction method in Barraquer's hands is doubtless a very good one, but its possibilities in other hands, positively bring cold shivers down the backs of the onlookers. Barraquer has said that had he need of an operation for cataract, being unable to have himself perform the suction operation, he would prefer the older method of extraction.

But progress is made if only the undesirability of certain methods is made certain, and while attracted by the skill and the ingenuity of this Spanish surgeon, we cannot feel that his is adapted to our needs.

And so it is the comets and meteors shoot across our skies, but for our daily tasks our commonplace sun and moon are our steadfast and reliable helpers. Our mental excursion into the atmosphere of the Orient recalls a quotation from Omar Khayam:

"Myself when young did eagerly frequent
Doctor and Saint and heard great Argument.
About it and about; but evermore
Came out by the same Door as in I went."

L. Webster Fox.

Philadelphia, Pa.

"Spectacles versus Eyeglasses."

To the Editor:—The small controversy on this issue, to which two old-time friends (Gould and Murphy) have committed themselves, seems to "point a moral" even if it does not "adorn a tale."

There is no gainsaying the rule that, until the eyes have been educated by spectacles, eyeglasses should not be ordered for continuous wear. They are ponderable, and their position, no matter how firmly attached to the skin, is inconstant because the skin will slip on the bone as the body moves; so that one, even without astigmatism, must make constant adjustments as for moving objects, more difficult if there is astigmatism. On the other hand, where glasses are worn only for close work, and the occupation generally sedentary, the convenience of eyeglasses (on an average nose) is a factor that may outweigh the more cumbersome spectacles' steadier images.

Cold science in excess, and "waiving a point" to please a patient are not to be commended as routine procedures.

Truly yours,
H. B. Young.

Burlington, Iowa.

Lens Extraction by Negative Pressure.

To the Editor:—In re an article in the May, 1922 issue of the Journal by James M. Ball, of St. Louis; on page 359, credit is given for extraction of the lens by negative pressure to an American ophthalmologist, Dr. Vard H. Hulen. Would that this were the case, but unfortunately in 1884, Burchardt advocated the idea of extraction of the lens within the capsule by suction. Later, Stoewer, of Witten, at the Heidelberg Congress in 1902, presented his instrument and the description of cases operated upon by this method. The spoon was identical with the one used by Barraquer, and the negative pressure was obtained with a rubber ball.

To call a method of extraction of the lens by negative pressure by the name of Barraquer, is no more justified than to call a method of extraction of the lens within its capsule by external pressure by the name of Smith. Both of the operators in question merely applied in a wholesale manner methods but little known.

Very truly yours,
Harry S. Gradle.

BIOGRAPHIC SKETCHES.

T. H. Shastid, M.D.
superior, wisconsin.

Ellis, Henry Bert, (H. Bert Ellis), a well known ophthalmologist of Los Angeles, California, died at his home in that city on May 15, 1922. He was born at Lincoln Center, Me., May 17, 1863, being, on his mother's side, a descendant of Governor Bradford of Massachusetts, and, on the father's, of Thomas Davis, Lord Mayor of London in 1867. His father was James Henry and his mother Annie M. Bullard, Ellis. The subject of our sketch received the degree of Bachelor of Arts at Acadia College, Wolfeville, N. S., in 1884, and the Doctor in Medicine at Los Angeles Department College of Medicine of the University of California, in 1888. He studied the eye, ear, nose and throat at the universities of Göttingen and Vienna. From 1889-93 he was engaged in general practice in Los Angeles; since 1893, at the same place, in the practice of the eye, ear, nose and throat only. He was a Fellow of the American Academy of Medicine, the American Laryngological, Rhinological and Otological Society, and the American Academy of Ophthalmology and Oto-laryngology. He was attending ophthalmologist to the Children's Hospital and the Los Angeles County Hospital. He was formerly professor of physiology in the College of Medicine of the University of California, and held the chair of ophthalmology in the same institution from 1896 to 1915.

Dr. Ellis was a large, stout man, of a ruddy complexion and a deliberate manner. He married, first, Lulu Talbot, and May 27, 1907 he married Florence Chandler.

ABSTRACTS

Wernicke, Otto. Glaucoma as the Result of Intraocular Disseminated Sclerosis. Buenos Aires, 1921.

The author enlarges his theory about keratoconus, assuming that glaucoma simplex is the result of a plaque of multiple sclerosis localized in the papilla. While in keratoconus the apex of the cornea is the less resistant point which gives way to the intraocular pressure, in simple glaucoma the lamina cribrosa, weakened by the development of the cavernous degeneration described by Schnabel, gives way and produces the excavation. Congestive or acute glaucoma can be explained by the localization of the sclerotic process in the angle of the anterior chamber, hindering filtration and producing increase of pressure.

As proofs of his ideas, Wernicke asserts: First, that the intraocular pressure remains generally normal in simple glaucoma. Second, that Schnabel found a case of multiple sclerosis associated with cavernous glaucomatous degeneration of the optic nerve. Third, that Koeppe has recently found as a preglaucomatous symptom, changes in the iris with wandering of large amounts of pigment.

The author recognizes that sclerosis disseminata is a disease of young people, while glaucoma is mostly to be found in old age, but the former is a long protracted disease, the foci tending to regression and may be stopped or overlooked, appearing later in life.

URIBE TRONCOSCO.

Bárány, R. Optical Nystagmus and "Railroad" Nystagmus. Upsala Läkareförening Förhandlingar. Vol. 26, Parts 5 and 6, Art. III.

By railroad nystagmus is meant such a nystagmus as a normal person shows in viewing the landscape from a moving train; the nystagmus presents its quick component in a direction opposite to the apparent motion of the landscape. A moving belt marked with vertical black and white stripes is used in testing for this nystagmus. The author has observed in a number of instances that in using this test, with a patient who already has an optical nystagmus—the nystagmus often present in cases of reduced vision—he obtains a nystagmus opposite to the normal, i. e., a nystagmus in the same direction as that of the belt. No satisfactory explanation for this reversal has so far presented itself.

D. L. T.

Addario, La Ferla. Injections of Sterilized Milk in Ocular Therapy. Arch. di Ott., 1921, v. 28, p. 204-213.

In a brief report of literature, the author mentions the report of Jocqs, who treated 26 cases of severe serpent ulcer by milk injection, without any other treatment, in all of which the hypopyon cleared up very quickly and good results were usually obtained. In one case with serpent ulcer and a suppurating lacrimal sac, the suppuration of the sac stopped entirely after the first milk injection, without treatment to the sac itself. Jocqs believes if the first injection has no effect, further injections are mostly useless.

The author has used milk injections in about two hundred cases, of which six examples are reported in detail. One was a very severe iridocyclitis which had resisted all other treatment. Twenty-four hours after the first injection, the hypopyon cleared up and in five days the eye was quiet. In one case, the pain from the post-operative hemorrhage into the anterior chamber stopped two hours after the milk injection.

In one case, injections were used as a prophylactic measure, before removing the prolapse from a perforating ulcer in the presence of severe catarrhal secretion in the conjunctival sac. Recovery from the operation was uncomplicated. A case of gonococcic conjunctivitis in a baby with an ulcer showed marked improvement twenty-four hours after the injection, and progressed steadily to a cure with three more injections. In cases of trachoma and phlyctenular conjunctivitis with recurrent ulcers, favorable results were

obtained likewise. The author thinks milk injections are indicated in all cases where body reaction is sluggish. The effect is especially surprising on the symptom of pain, which disappears almost at once.

S. R. G.

Williamson, F. A. Thrombosis of the Retinal Vein, Showing a Hole and a Star in the Macula. British J. Ophth., v. 6, No. 2, 1922, p. 67.

The observer's discussion of the pathology of hole at the macula is accompanied with four photographs from the above cases. He refers to Ogilvie's theory, the thinness of the fovea and tear by "contrecoup", Fuchs' theory of a mild traumatic retinitis, with a mild toxic stimulus resulting in a slight serous exudate with rupture, and Coats' theory of edema.

The first patient had failing vision 14 years, with history of trauma 30 years previous. The eye was removed for absolute glaucoma. Sections showed no cupping of the disc, and a thrombosed vein near its margin. In the macular region the rods are fairly well preserved, but between them and the pigment layer is a thin layer of structureless material, presumably edematous fluid. A section near the fovea showed a cyst whose anterior wall was the membrana limitans externa of the retina, the layer of rods having disappeared. A section at the fovea showed absence of anterior cyst wall, thus presenting a hole.

The second case showed a thrombosed vessel on the side of the slightly cupped disc. Between the disc and macula there was a small collection of coagulated fluid between the choroid and rod and cone layer. At the macula a much larger collection of exudate, the retina showing advanced cystic degeneration. No macula hole, but if the condition had lasted longer a hole might have formed. After discussing three points in favor of the edema arising from the retinal vessels and five favoring a choroidal origin, the author suggests the following possible solution of the problem.

In these two cases we have a toxic influence—shown by the presence of the iridocyclitis—acting on the retinal veins, causing thrombosis, and acting on the delicate macular choroidal capillaries, causing degeneration of their walls, increased permeability to fluid, and consequent edema. This fluid then diffuses or osmoses thru into the potential space between the rods and cones and the pigment epithelium, preventing the access of nutrient materials from the choriocapillaris so that the superjacent retina degenerates and forms a hole.

D. F. H.

Herbert, Lieut.-Colonel H. After Treatment of Small Flap Sclerotomy. British J. Ophth., v. 6, No. 2, 1921, p. 65.

At the time of Cruise's observation regarding the application of finger pressure to the eye as an immediate after treatment. Herbert was not much impressed. He had used massage with very little effect. This he now believes was due to beginning too late. The application of gentle sustained finger pressure thru the lower lid may be begun on the afternoon or evening of the operation day, and repeated two or three times daily, partly emptying the anterior chamber. Excessive use of this pressure may be expected possibly to increase the number of partly fistulous cicatrices, but such scars from this operation do not seem to lead to late infection. After the first few hours the patient should be encouraged to keep his eyes open and to blink frequently.

D. F. H.

Wright, Robert E. Keratomalacia in Southern India. British J. Ophth., v. 6, 1922, p. 164.

The author discusses the relation deficiency diseases have to keratomalacia. Particular attention is given to the deficiency of the vitamin fat-soluble A. It is still questionable whether the clinical condition described as keratomalacia or xerophthalmia is similarly produced as the experimentally induced lesions in white rats by McCollum and his coworkers. The author quotes Col. Kirkpatrick of the Madras Government Ophthalmic Hospital:

"They are never without such cases, particularly during famine periods. It is more common with children, yet it is present in adults. There is lack of some essential substances in the dietary that experience has shown are present in cod liver oil. A premonitory sign of the disease is a condition which closely resembles, and is probably identical with ordinary night blindness. The triangular area of conjunctiva exposed by the palpebral fissure stiffens, showing later a soap lather formation. The cornea hazes, and later melts away exposing the iris, the bulb later becoming phthisic. Atropin is generally harmful. Castor oil, chlorides of calcium, sodium and ammonium are useful but the essential remedy is cod liver oil."

Wright comments that no doubt in certain cases epithelial xerosis and keratomalacia tend to overlap. There is not necessarily a triangular patch of xerosis nor yet white foam in keratomalacia, altho such may occur. On the other hand, the triangular or rounded islands of greasiness on either side of the cornea may occur in an apparently otherwise normal individual, without night blindness, and the term epithelial xerosis seems to fit such cases. Since bad and insufficient food is almost universal amongst the poorer classes, we have locally all the factors necessary for the production of a vicious circle, such as one is accustomed to associate with keratomalacia, in which alimentary tract and liver play their part.

There is in Southern India a clinical condition known by the name of keratomalacia, in which the symptoms of corneal degeneration form one of the leading features, inasmuch as it most frequently brings patients to seek relief; night blindness is frequent but not so important a symptom. The disease is not sharply marked off, but is a complex generalized disorder frequently associated with affections of the alimentary canal, grave constitutional disturbance and marasmus. In advanced cases it frequently ends fatally with terminal intestinal and lung affections. In less severe cases, blindness is a common result.

It is practically always associated with deficiencies in the dietary of a general type, but general deficiency is so common, that to account for the comparative rarity of the disease one must suppose that other etiologic factors or determinants are necessary. Clinical observations suggest the great importance of the liver, thyroid and intestine in these respects. The condition does not appear to correspond to experimental keratomalacia or xerophthalmia, due to the deprivation of fat-soluble A; nor does it respond in the same way to the administration of a diet rich in this food essential.

It does, however, respond slowly to treatment, the chief measures being: general care of the eyes and intestinal tract, and the administration of cod liver, liver, thyroid extract, and salts. The prognosis as regards sight is bad if both cornea are attacked before treatment is commenced. The condition is undoubtedly preventable, but the problem of its prevention, like so many of the great health problems of Southern India, largely resolves itself into an economic one, to be dealt with by the financial rather than the medical authorities. D. F. H.

Kleefeld, G. Physiologic and Pathologic Pupillometry. A new method of measuring the photomotor reflex of pupil. Ann. d'Ocul., 1921, v. 158, p. 262-304.

In this, the third part of his work (Ann d'Ocul. 1921, v. 158, p. 4) the author analyzes his findings under the following heads:

(1) The normal eye. Each pupil has a certain period of contraction, which varies according to the variations of the extent of the dilatation. In each case, there is a certain period of latency, and the time of the contraction is proportional to its amount. For each eye there is a certain rapidity for each stimulus.

(2) The pathologic eye. (a) Albinism: Owing to the absence of pigment and the slight development of the

iris musculature, the pupillary reactions require a considerable time. (b) Hyperopia: Nothing of importance. (c) Myopia: Similar to albinism. (d) Cataract. Altho the intensity of light is diminished, it is diffused so that a greater number of retinal elements are stimulated. The reactions should be at least as good as that of a normal eye, if the operation is to be successful. (e) Amblyopia ex anopsia: The reactions are about the same as those of a normal eye. Even in a case of functional destruction of the macula, the reactions were perfect even when the blind area was stimulated. (f) Anatomic destruction of the macula: In such a case, there were no reactions when the macula alone was stimulated. The pupillometer is adapted for determining hemianopsias and scotomata in the visual field. (g) Optic neuritis: If this is unilateral, the reaction is less pronounced and prolonged, while the consensual, when the other eye is illuminated, is more pronounced. This is true even in retrobulbar neuritis. (h) Nonsyphilitic atrophy of the optic nerve: The pupil reacts to a medium illumination, or to a brief but intense one. (i) Essential nyctalopia: The pupillary reaction is very slight and not distinct. (j) Essential hemeralopia: The reactions differ little from that of the normal eye.

(3) The eye in affections of the nervous system. Asthenopia. Nervous affections: The reaction is sometimes most pronounced, sometimes slight, occasionally normal.

(4) The eye when influenced by drugs: Cocain provokes a short period of excitation immediately after its instillation, followed shortly by a period requiring a certain duration of the stimulation.

(5) The eye in generalized syphilis: This disease acts as a constant stimulus up to the time when paralysis suddenly appears. In primary syphilis, the reaction is quicker than in the normal eye, in secondary syphilis is quicker than in primary, and in tertiary it is so rapid as to deserve the term "jumping reflex," ("reflexe sautillant"). C. L.

Candians. Arterial Anastomoses Following Embolism of the Central Artery. Arch. di Ott., 1921, v. 28, p. 89-101.

The author reviews a case which he published with Rados a short time before. This was of a woman with an embolism of the central artery of the retina, in whom, a few days after the embolism occurred, a small cilio-retinal vessel was seen to anastomose with the superior temporal artery above the macula, and to become greatly enlarged. Vision recovered to 6/60 and most of the retina assumed a normal appearance.

The second case was seen only a few weeks after this, and was in a woman of 24 with a typical embolism of the central artery. She was treated by paracentesis at the time of her first appearance. Two days after this, some very small vessels extending temporally from the edge of the nerve were seen to become more prominent; and during daily observation, these were seen to dilate markedly and to connect with the inferior and superior temporal arteries respectively.

The author believes the increase in size of the arteries in the second case is due to deep anastomoses with choroidal vessels and therefore different from the first case, in which the anastomosis was of the peripapillary network of Zinn. A few cases like the first have been described and a number of cases of venous anastomosis; but the author believes the second case is unique in the literature. S. R. G.

Kafka, P. Epibulbar Melanosarcoma and Radium Therapy. Wien. med. Woch., 1921, p. 1060.

Report of a case of melanosarcoma affecting the whole of the conjunctiva, which was almost black and grew upon the cornea. After five exposures to the X-rays (not radium as the title would indicate) in intervals of three to four weeks and of thirty to forty minutes duration, the tumor became flattened, and the scleral conjunctiva and the conjunctiva overlapping the cornea became clearer. Future references on the results will be given later. H. A.

Kramer, R. Keratomalacia in Erythrodermia Desquamativa. Wien. med. Woch., 1921, p. 1063.

Kramer reports the case of an infant which fourteen days after birth became affected with erythrodermia desquamativa. Thirteen weeks later a croupous conjunctivitis with xerosis of the bulbar conjunctiva developed, with extensive infiltrations of the cornea with superficial loss of tissue. Improvement of the general condition caused the erythrodermia to improve, good vision resulting. H. A.

Lauber, H. Treatment of Superficial Affections of the Cornea with Radium. Wien. med. Woch., 1921, p. 1066.

Lauber reported three cases of recurrent keratitis which resisted the usual treatment, until radium was used. He employs radium emanations to recurrent erosions of the cornea, herpes corneae, dystrophia epithelialis corneae (Fuchs), keratitis punctata superficialis, etc. H. A.

Lindner, K. On Ophthalmia of the Newly Born. Wien. med. Woch., 1921, p. 1068.

According to Lindner, a number of cases of ophthalmia neonatorum are not due to the gonococcus of Neisser, but to virus from the genitals of the mother, which during birth are deposited upon the conjunctiva of the new born. This ophthalmia he calls "inclosure" blennorrhea or ophthalmia. It appears at the earliest on the fifth day, but generally on the seventh or eighth day, while the gonoblennorrhea begins rarely after the fourth day. H. A.

Meller, J. Intraocular Pressure After Extraction of Senile Cataract. Wien. med. Woch., 1921, p. 1070.

After extraction of senile cataract, one occasionally encounters intraocular pressure due to various causes, for instance cyclitis, iridocyclitis with exudation into the anterior chamber, circular synechiae of the pupil with the capsule of the lens, synechiae of the iris in the incision, synechiae of the iris with the cornea. Aside from this secondary glaucoma, primary glaucoma occurs without any apparent cause, either in the acute form, or, which is more frequent, in the chronic form. But also this glaucoma is secondary; as probably in this case the anterior chamber is not reestablished in due time, possibly thru remnants of lenticular matter in the wound, retarding the agglutination of the edges of the wound, which can also have the effect of attaching the iris into the angle of the chamber. H. A.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. A. Del Monte, professor of ophthalmology at the University of Naples.

Dr. John Herbert Claiborne, New York, aged sixty-one, died May twenty-seventh, from heart disease.

Dr. Daniel B. Smith, Cleveland, aged seventy-one, died May nineteenth.

Dr. John R. Robinson, Colorado Springs, Colorado, aged sixty-six, died at St. Joseph, Michigan, May tenth.

Dr. Alfred Helmholtz, New York City, aged forty-nine, died May eighth from an overdose of poison.

PERSONALS.

Dr. Francisco Matanzo, of New York, is visiting in Porto Rico.

Dr. Wm. H. Minton has been recently appointed ophthalmologist of State Hospital Number Two, St. Joseph, Missouri.

Dr. Mary E. Brydon, of the State Board of Health of Virginia, has been appointed one of the commissioners at large to investigate the feasibility of establishing separate schools for the deaf and blind.

During the visits of Mr. Treacher Collins of London, Professor Mackay of Edinburgh, Professor Magitot of Paris, for the International Congress of Ophthalmology, a luncheon was given to them at his country home by Dr. S. Lewis Ziegler.

Dr. George E. de Schweinitz, President of the American Medical Association, has accepted the invitation to deliver the Bowman Lecture in London, in 1923. He was also honored recently by promotion to Brigadier General in the Medical Reserve Corps.

Dr. Wm. Campbell Posey, of Philadelphia, gave a luncheon at the University Club, in honor of Professors Rochat, Gallemaerts, Gullstrand and Dr. Elliot, Dr. Clegg and Dr. Nordenson. A luncheon was given the same group of ophthalmic surgeons by Dr. G. Oram Ring, at the Union League.

Dr. Thomas Hall Shastid, of Superior, Wisconsin, received, at the recent Commencement of the University of Wisconsin, the honorary degree of Doctor of Science. Dr. Shastid was given a luncheon by the eye, ear, nose and throat men of Madison, following the commencement exercises, and a dinner by the Medical Faculty of the University.

SOCIETIES.

The tenth annual session of the Pacific Coast Oto-Ophthalmological Society will be held in Salt Lake City, September 14-16, the week preceding the meeting of the American Academy of Ophthalmology at Minneapolis.

The Sioux Valley Eye and Ear Academy held its meeting at the Hotel Fontanelle, Omaha, Nebraska, Tuesday, July eleventh. Clinics were held in connection with the session at the various hospitals of the city during the forenoon.

The Brooklyn Ophthalmological Society was organized May ninth. The officers elected were: President, Dr. Joseph E. Golding; Vice-President, Dr. Ralph I. Lloyd; Secretary-Treasurer, Dr. Willis M. Bardner. Membership is limited to oculists resident on Long Island.

At the annual meeting of the American Ophthalmological Society held in Washington, May 1-3, the following officers were elected for the ensuing year: President, Dr. William H. Wilmer, Washington, D. C.; Vice-President, Dr. Alexander Duane, New York; Secretary-Treasurer, Dr. Thomas B. Holloway, Philadelphia.

At the annual convention of the Ophthalmological Society of the United Kingdom, held May eleventh, in London, the following officers were elected: President, Dr. A. Maitland Ramsay; Vice-presidents, Drs. J. H. Fisher, Sir John H. Parsons, Harold Grimsdale and Cyril Walker; Secretaries, Drs. J. F. Cunningham and R. Foster Moore, and Treasurer, Sir Arnold Lawson.

OPHTHALMOLOGY AND MEDICAL STUDIES.

Now that all scientific societies are discussing new regulations to govern medical studies, the Belgian Society of Ophthalmology has expressed the wish that the resolutions quoted herewith concerning the study of ophthalmology be adopted: Members of the Belgian Society of Ophthalmology, after careful study of the report made by the committee appointed by the Royal Academy of Medicine to study reforms to be introduced in the curriculum of medical studies, believe that the importance of the ophthalmologic clinic should not be curtailed, for these reasons: 1. Cases of disease of the eyes are very frequent, always serious and often grave. 2. City practitioners can send their patients to specialists, while those who practice in the country or in small towns cannot do so, and they form the majority. It is of utmost importance that they acquire sufficient ophthalmologic knowledge if serious consequences are to be prevented. 3. If we take into account that clinical and operative demonstrations are given only to a small number of pupils at a time, that students must be given individual attention in the various methods of examination, and that it would be a mistake to reduce the time devoted to clinical teaching, as clinical studies are the aim of all medical studies, we can conclude that the two years' study of this branch of medicine is not too much.

MISCELLANEOUS.

The New York Association for the Blind received a bequest of $5,000 by the will of Miss Lucy Kirtland.

The new Eye, Ear, Nose and Throat Hospital, under construction in New Orleans, was opened for inspection, May twelfth.

Miss Catherine Genin Burke of Chicago, who is blind, has thru her high grade in scholarship, qualified for election to Phi Beta Kappa, at Barnard College.

The National Committee for the Prevention of Blindness has announced that the entire subject of eye hazards in industrial occupations will be brought up to date in a revised edition of Bulletin 12 to be published in the fall.

One hundred and ten doctors took Professor Fuchs' course at Chicago. Of these, eighty-six were from Illinois (76 from Chicago); one from California, two from Colorado, three from Indiana, two from Kansas, two from Michigan, one from Minnesota, two from Nebraska, two from North Dakota, two from Ohio, one from Oregon, two from Utah and four from Wisconsin.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Bodenheimer. Stigmatometers. Berlin Ophth. Soc., March, 1922. Klin. M. f. Augenh., 1922, v. 68, p. 650.

Dimmer, F. Diagnostic difficulties in ophthalmology. Wien. med. Woch., 1922, v. 72, p. 638.

Ewing, A. E. Value of letters and characters as visual tests. Inter. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, p. 497.

Ferree, C. E., and Rand, G. Illuminated perimeter with campimeter features. (5 ill.) A. J. O., 1922, v. 5, pp. 455-465.

Gullstrand, A. Diaphragm lamps in ophthalmology. Intern. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, pp. 492-497.

Kraupa, E. Examination of corneal nerves and corneal degeneration with slit lamp. Klin. M. f. Augenh., 1922, v. 68, p. 448.

Lauber, H. Slit lamp microscopy in red free light. Wien. klin. Woch., 1922, v. 35, p. 407.

Peter, L. C. Standards for field taking. Intern. Congress of Ophth., April, 1922. A. J. O., 1922, v. 5, p. 499.

Rochon-Duvigneaud. Method of determining visual fields in vertebrates. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

THERAPEUTICS.

Nowak, E. Results of treatment of tuberculous lesions by partial antigen. Zeit. f. Augenh., 1922, v. 47, pp. 320-351.

Salvarsan therapy. Zeit. f. Augenh., 1922, v. 47, pp. 355-359.

Sgrosso, S. Retrobulbar injections in ocular therapeutics. Arch. di Ottal., 1922, v. 29, pp. 131-144; 173-182.

OPERATIONS.

Duverger. Systematic regional anesthesia. Soc. Franç. d'Opht., 1922, May. Ann. d'Ocul., 1922, v. 159, p. 476.

Merz-Weigandt, C. Hair sutures. Klin. M. f. Augenh., 1922, v. 68, p. 637.

PHYSIOLOGIC OPTICS.

Dor, L. Reflex directing eyes in reading. Ann. d'Ocul., 1922, v. 159, p. 474.

Guist, E. Geometric foundation of paralactic displacement. Zeit. f. Augenh., 1922, v. 47, pp. 257-268.

Polack. Distinct vision in spite of ocular chromatism. Ann. d'Ocul., 1922, v. 159, p. 474.

Robinson, S. H. Torsion and law of Listing. Arch. of Optometry, July, 1922, pp. 109-124.

Schanz, F. Theory of vision. Zeit. f. Augenh., 1922, v. 47, pp. 351-355.

Tscherning. Photometric glass. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

Werbitzky, W. K. Schematic eye. (2 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 588-598.

Weckert. Trifocal glasses. Klin. M. f. Augenh., 1922, v. 68, p. 638.

REFRACTION.

Belehradek, J. Experimental transient astigmatism from strain of ciliary muscle. Casopis Lek. Ceskych Prague, 1922, v. 61, p. 81.

Bestor, H. M. Relationship between accommodation and convergence. Arch. of Optometry, July, 1922, pp. 134-143.

Druault-Toufesco, S. Myopia. (10 ill. bibl.) Ann. d'Ocul., 1922, v. 159, pp. 321-364.

Elschnig, A. Treatment of myopia. Med. Klin., 1922, v. 18, pp. 683-685.

Enroth, E. Transitory hyperopia in diabetes. Acta Med. Skandin., 1922, v. 56, p. 500. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 627).

Hegner, C. A. Action of spectacles. Schweiz. med. Woch., 1922, v. 52, p. 302. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 620).

Jablonski, W. Hereditary myopia. (bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 560-573.

Keyms, J. Axis of astigmatism and its location. Brit. Med. Jour., 1922, May 27, p. 838.

Levinsohn, G. Motion of optic nerve and genesis of myopia. Klin. M. f. Augenh., 1922, v. 68, pp. 574-577.

McFadden, F. Refraction of cornea. Arch. of Optometry, July, 1922, pp. 143-149.

Olsho, S. L. Protractor card for verifying axes of cylindric lenses. (3 ill. bibl.) A. J. O., 1922, v. 5, pp. 451-454.

Peckham, R. M. Vertex diopter. Arch. of Optometry, July, 1922, pp. 124-134.

OCULAR MOVEMENTS.

Aubaret. Syndromes of strabismus. Marseille Méd., 1922, v. 59, p. 289. Abst. Intern. Med. and Surg. Survey, 1922 (8a, 638).

Ballantyne, A. J. What is heterophoria? Glasgow Med. Jour., 1922, v. 15, pp. 321-329.

Barton, M. H. Diplopia in general practice. Clin. Jour., 1922, May 31, pp. 257-262.

Bielschowsky, A. Genesis of abnormal convergent positions of eyes. Arch. f. Psychiat. u. Nerv., 1922, v. 65, p. 127. Abst. Intern. Med. and Surg. Survey, 1922 (8a 633).

Cantonnet, A. Stereoscope of Pigeon and strabismus. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 475.

Coppez, H. Electric lamp in diagnosis of diplopia. Clin. Opht., 1922, v. 26, p. 258.

Ellett, E. C. Unilateral nystagmus. (Dis.) A. J. O., 1922, v. 5, p. 483.

Freytag, G. T. Bilateral trochlearis paralysis. (1 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 452-460.

Kleyn, A., de. Vestibular ocular reflex. (4 ill.) Graefe's Arch. f. Ophth., 1922, v. 107, pp. 480-488.

Jackson, E. Wearing of correcting prisms. A. J. O., 1922, v. 5, pp. 500-501.

Luedde, W. H. Amblyopia ex anopsia and recovery of vision. (Dis. p. 391, bibl.) A. J. O., 1922, v. 5, pp. 441-451.

Nishi, L. Comparative anatomy of muscles of eye. Arbeit. a. d. Anat. Inst. Sendai, Japan, 1922, April 5, p. 65.

Ourgaud, G. Genesis of concomitant strabismus. Marseille Méd., 1922, v. 59, p. 310. Abst. Intern. Med. and Surg. Survey, 1922 (8a 639).

Ourgaud, G., and Sedan, J. Converging spasm with contractions of orbicularis with mastication. Marseille Méd., 1922, v. 59. p. 327. Abst. Intern. Med. and Surg. Survey, 1922 (8a 637).

Percival, A. S. First report of miners' nystagmus committee. Lancet, June 10, 1922, p. 1168.

Miners' nystagmus. Brit. Med. Jour., June 10 and 17, 1922, pp. 932-936.

Report on miners' nystagmus. Brit. Jour. Ophth., 192, v. 6, pp. 262-266.

Scharnke. Neurologic significance of nystagmus. Arch. f. Psychiat. u. Nerven., 1922, v. 65, p. 249. Abst. Intern. Med. and Surg. Survey, 1922, (8a 646).

Sedan, J. Modification of diplopia in strabismus. Marseille Méd., 1922, v. 59, p. 315. Abst. Intern. Med. and Surg. Survey, 1922 (8a 636).

Tristaino, B. Interstitial myositis of syphilitic nature. Gior. di Ocul., 1922, v. 3, p. 45. Abst. Intern. Med. and Surg. Survey, 1922 (8a 632).

Wilson, J. A. Miners' nystagmus. Lancet, June 24, 1922, p. 1270.

CONJUNCTIVA.

Aubaret. Neoplastic pterygium. Marseille Méd., 1922, v. 59, p. 385. Abst. Intern. Med. and Surg. Survey, 1922 (8a 660).

Colmant, J. Treatment of phlyctenular keratoconjunctivitis. Clin. Opht., 1922, v. 26, p. 255.

Fischer, E. Streptococcus mucosus in chronic ulcerous conjunctivitis. (bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 553-556.

Kalt. Follicular conjunctivitis after baptism in pool. Soc. d'Opht. de Paris, March 18, 1922. Ann. d'Ocul., 1922, v. 159, p. 399.

Kleczkowski, F. Suture in resection of conjunctival fornix. (bibl.) Clin. Opht., 1922, v. 26, pp. 250-254.

Lahm, W. Pathologic anatomy of ophthalmoblennorrhea. Arch. f. Gynaek., 1922, v. 115, p. 611. Abst. Intern. Med. and Surg. Survey, 1922 (8a 667).

Liebermann, L. v. Resection of tarsal conjunctiva in vernal conjunctivitis. Klin M. f. Augenh., 1922, v. 68, p. 617.

Marcotty, A. H. Bone formation in conjunctiva from caterpiliar hairs with changes in cornea. (3 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 443-448.

Martin, E. S. Sophol in prophylaxis. Klin. Woch. 1922, v. 1, p. 733. Abst. Intern. Med. and Surg. Survey, 1922 (8a 668).

Petit, P. J. Trachoma in Tunis. (3 ill.) Ann. d'Ocul., 1922, v. 159, pp. 365-386.

Pillat, A. Bacteriology of pneumococcus conjunctivitis. (4 ill.) Klin. M. f. Augenh., 1922, v. 68, pp. 533-553.

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Sedan, J. Scrubbing treatment of trachoma after Trantas. Marseille Méd., 1922, v 59, p. 344. Abst. Intern. Med. and Surg. Survey, 1922 (8a 673).

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Thomas, H. G., and Baxter, F. S. Monocular trachoma. A. J. O., 1922, v. 5, p. 470.

Tooker, C. W. Trachomatous pannus and ulcer treated with tinctur of iodin. (Dis.) A. J. O., 1922, v. 5, pp. 480-482.

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Arana, J. de. Treatment of serpiginous ulcer of cornea. España Oft., 1922, v. 7, pp. 61-70.

Besso, M. Eczematous keratoconjunctivitis. Gior. di Ocul., 1922, v. 3, p. 51. Abst. Intern. Med. and Surg. Survey, 1922 (8a 677).

Calzavara, G. Macroscopic findings on corneas exposed to vaccine and chicken pox virus. Igiene Mod., 1922, v. 15, p. 44. Abst. Intern. Med. and Surg. Survey, 1922 (8a 686).

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Lehrfeld, L. Superficial punctate disease of cornea. (Dis.) A. J. O., 1922, v. 5, p. 486.

Munoz Urra, F. Traumatic corneal ectasia. (5 ill. bibl.) Arch. de Oft. Hisp.-Amer., 1922, v. 22, pp. 242-250.

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Induced inequality of pupils and early diagnosis of pulmonary tuberculosis. New York Med. Jour., 1922, June 21, p. 774.

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Oloff. Hemianopic pupil reaction. Münch. med. Woch., 1922, v. 69, p. 462.

Saupe, K. Malformation of dilatator pupil muscle. Klin. M. f. Augenh., 1922, v. 68, pp. 464-471.

THE UVEAL TRACT.

Aubaret. Congenital infantile iridochoroiditis. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 477.

Blue, J. B. Bilateral aniridia. (Dis.) A. J. O., 1922, v. 5, p. 483.

Brandes. Acute chorioretinitis of ethmoidal origin. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 465.

Dupuy-Dutemps. Acute infectious iridochoroiditis. Soc. Franç. d'Opht., 1922, May. Ann. d'Ocul., 1922, v. 159, pp. 447-458.

Jeandelize, P., and Bretagne. Metastatic choroiditis in infant. Soc. Franç. d'Opht., May, 1922. Ann. d'Ocul., 1922, v. 159, p. 459.

Jocqs, R. Chronic uveitis. Clin. Opht., 1922, v. 26, pp. 243-250.

Meller, J. Detachment of retina in iridocyclitis. (3 ill.) Zeit. f. Augenh., 1922, v. 47, pp. 247-257.

Tuberculosis of choroid. Zeit. f. Augenh., 1922, v. 47, pp. 5-19.

Rae, L. Choroiditis. (Dis.) Royal Soc. Med., Sec. on Ophth., 1922, March. A. J. O., 1922, v. 5, p. 475.

Roche, C. Diffuse choroiditis in old people. Ann. d'Ocul., 1922, v. 159, p. 478.

Tooker, C. W. Recurrent cyclitis following sphenoiditis. A. J. O., 1922, v. 5, p. 482.

Triebenstein, O. Congenital anomalies of iris. (2 ill. bibl.) Klin. M. f. Augenh., 1922, v. 68, pp. 578-587.

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DELIMITING KERATOTOMY.

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The three cases here reported illustrate the practical value of delimiting keratotomy in checking the spread and progress of corneal ulcers. The principles on which the treatment are based are pointed out, and the technic of treating such cases is illustrated.

The object of this paper is to call further attention to a procedure described by H. Gifford in 1918,[1] which has proved of great value in the treatment of certain severe corneal ulcers and which is not, I believe, used as widely as it deserves to be. I have even heard an ophthalmologist condemn in unqualified terms the use of knife or cautery in the treatment of any corneal ulcer.

The following cases are chosen as severe corneal affections which would, I believe, have run a much more severe course, with serious loss of vision, without the use of a delimiting keratotomy.

CASE I. Small Pox Infiltrate of Cornea: Mr. B., aged 51, was referred by Dr. S. M. Shramek of Omaha, complaining of pain and poor vision in R. E. He had recovered from small pox about two weeks before, and his eye symptoms had been growing worse since then. Examination revealed two small infiltrates of the right cornea, one at the inner limbus covered by epithelium and apparently quiet; the other about 2 millimeters from the limbus at eleven o'clock. This stained slightly with fluorescein, and congestion was most marked near it. Vision R. E. 20/100; L. E. V. = 20/50, was apparently normal. The staining area was touched with trichloracetic acid. Atropin, argyrol and hot applications were prescribed. The following three days, in spite of similar treatment, the infiltrate continued to increase in size, while congestion and pain were more severe. The ulceration remained superficial, but the infiltrate was much deeper and extended ahead of the staining area in the manner of a typical small pox infiltrate, in which the loss of epithelium is a secondary and minor affair. Having seen a number of these lesions progress to severe loss of vision unaffected by treatment applied to the surface of the cornea, an early delimiting keratotomy was decided upon. This was done on the fourth day, the cut being made in healthy tissue just ahead of the infiltrated zone and extending beyond it on either side. It was kept open daily for twelve days by touching one edge of the cut gently with the point of a knife and allowing 1/2 to 2/3 of the aqueous to escape. The area was touched with liquified iodin before being opened, and sometimes this application itself could be made to open the wound. The pain was almost entirely relieved after the cut was made, and the infiltrate never progressed beyond the cut. Some congestion remained for about three weeks. After the wound had closed, massage with yellow oxid ointment was prescribed daily and the opacity diminished considerably in size. After six weeks, vision was 20/30; with —0.25 ⊃ —1.00 cyl. ax. 20°=20/20.

To oculists who have not seen many of these small pox infiltrates, it may seem that this result might have been obtained by less radical methods. In our region, however, we have seen a considerable number in the past three years and their course, in spite of cauterization, the thermophore, and other local and general measures, has invariably been very severe. This is

the only one in my experience which did not suffer severe loss of vision.*

Case II. Mooren's Ulcer (?): Mr. L——, aged 65, came in complaining of pain in R. E. The trouble had begun about four days before, after he had gotten something, probably a piece of plaster or brick, in the eye. Vision was 20/30. Both eyes showed an unusually broad arcus senilis. In the right eye, near both the inner and outer limbus, the arcus was broadened into a white plaque about 4 millimeters in diameter. At the inner limbus, the surface of the plaque was roughened and stained with fluorescein. There was but moderate congestion and little pain, only the sensation of a foreign body. The staining area was touched thoroly with trichloracetic acid. Atropin and heat were prescribed. The next few days, in spite of local cauterization and this treatment, the stained area progressed. It remained about four millimeters in diameter, healing towards the limbus and progressing slowly towards the center. Smears of corneal scrapings were negative. There was not much more congestion than at first, and only a little more pain, the course resembling a rodent or Mooren's ulcer. On the 6th day, Dr. Harold Gifford applied the actual cautery over the whole affected surface, undermining at the limbus well back into the healthy conjunctiva. In spite of this the central border continued to progress. On the 13th day, I made a delimiting keratotomy just beyond the central border, the patient having been hospitalized. This incision was kept open twice daily for about ten days, with applications of iodin, atropin and instillations of strong and weak zinc. The pain, which had increased, before the keratotomy, now became much less severe, and the ulcer continued to heal from the periphery, never advancing beyond the line of incision. When first refracted, corneal astigmatism was marked (7 D.) but finally vision of 20/30 was recovered with +0.25 cyl. ax. 20°, and the eye was perfectly quiet.

Fig. 1. Result of delimiting keratotomy for Mooren's Ulcer Case II.

Case III. Serpent Ulcer: George C——, colored, aged 30, was seen at the Douglas County Hospital. Five days before he had been hit in the left

*This subject of small pox infiltrates is more fully discussed in a paper now under preparation by Dr. James M. Patton. It is interesting that C. L. Smith, in a recent article (A. J. O. 1922; 5, p. 32) reports that the only eye saved in three cases was one in which he performed the Saemisch incision.

eye by a stick, since when it had been inflamed and painful. Examination revealed a corneal ulcer about 1 1/2 millimeters in diameter just temporal from the center of the left cornea. After cocainizing, a careful curettage showed that the ulcer extended almost to Descemet's and was undermined at the edges. Trichloracetic acid was applied thoroly on a fine cotton point, and atropin, argyrol and heat prescribed. After three days of such treatment, the ulcer continued to extend slightly in all directions, pain was severe and a slight hypopyon developed. Smears of scrapings showed no organisms. After curetting and applying iodin, a cut was made thru the cornea just medial to the ulcer. This was kept open daily and local treatment continued. Trichloracetic acid, iodin, carbolic acid, and solid optochin were all used for cauterization. In spite of this, the ulcer extended upwards slightly, reaching 4 millimeters in diameter, without, however, crossing the cut. Pain was relieved after opening the chamber each time, but returned some hours after, and for several days, it was opened twice daily. On the 12th day, the chamber was found empty. From this day, pain stopped almost entirely and healing began. When the chamber began to refill three days later, it was allowed to remain so, with no return of pain or congestion. Daily massage with yellow oxid ointment was begun a few days later. When last seen, the eye was quiet with a leucoma about 3 millimeters in diameter, not involving the pupillary space.

The principles underlying keratotomy of any kind in severe ulcers are well understood by users of the Guthrie-Saemisch incision. They are the same as those used by the general surgeon who incises any swollen, inflamed part. The affected cornea is at once relieved of the pressure exerted upon it by the intraocular fluids. The lymph flow, kept at a very low rate by the normal tension upon the cornea, is at once accelerated in the direction of the cut part, bringing in a fresh supply of antibodies, leucocytes and nutrition. It is well known that when an ulcer perforates spontaneously in gonorrheal ophthalmia, if often begins at once to heal, especially if there is a leakage of aqueous for a few days.

While the idea of making the incision a "delimiting" one was apparently used by Alfred Graefe and Meyerhofer, H. Gifford arrived at it independently, and his explanation of its action as distinct from that of any keratotomy, is, so far as I know, original. This explanation he found in the rapidity with which the wound is filled with corneal epithelium. From the fact that most severe ulcers progress by undermining the epithelium, he assumed that it is more resistent than the stroma and that an epithelial plug might act as a barrier to further infection. According to Parsons[2], after a keratotomy, the anterior triangle left by the gaping of the edges is filled with epithelium in 24 hours, including half or sometimes more of the thickness of the cornea. If the wound is kept open for several days it would seem likely that this epithelial plug would extend almost thru the cornea. This factor, of course, if effective, is so in addition to the other factors described as playing a part in any keratotomy.

The cut is made with a thin Graefe knife thru the entire thickness of the cornea, being tangential to the ulcer and as close as possible to its most central edge without touching it. Keeping the wound open once or twice a day is usually sufficient, without making a more permanent opening with the cautery. Case III, however, tho the ulcer never passed the line of incision, did not begin to heal until the chamber remained empty by continuous leakage. Each opening should be made after careful inspection in a good light to be sure that the chamber is not already empty, in which case the lens might easily be injured. The possibility that a cataract might result from prolonged contact between lens and cornea I have not seen realized.

One hesitates to inflict such additional trauma to a cornea unless it is necessary, and a great number of ulcers, of course, do well without it.

It is important in any case, however, to realize quickly when ordinary treatment is proving ineffective and to adopt more radical measures before vision is permanently damaged. I believe there are a great many such cases in which the most valuable radical measure is keratotomy, and there seem to be reasons, brought out strongly by results in my limited experience, why this keratotomy should be made "delimiting."

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HYPERSENSITIVENESS TO LENS PROTEIN. PATIENT DESENSITIZED AND SUCCESSFULLY OPERATED ON FOR IMMATURE CATARACT.

F. H. VERHOEFF, M.D., AND A. N. LEMOINE, M.D.

BOSTON, MASS.

The case here reported furnished a clinical test of the importance of the views presented at the International Congress (see p. 737.) Desensitising injections of lens protein are not recommended for all cases of cataract; but for those proven sensitive and over fifty years of age, who may be operated on with intentional or accidental opening of the lens capsule.

In a paper presented before the recent International Congress of Ophthalmology (see Trans.), we have shown that about eight per cent of individuals are hypersensitive to lens protein; and that when in a hypersensitive individual the lens capsule is opened thru operation or injury, there results an intraocular inflammation which we have termed phacoanaphylactic endophthalmitis. Owing to the danger of rupture of the lens capsule in the intracapsular operation in patients under fifty years of age, we suggested that in a hypersensitive patient under this age, with immature cataract, an attempt be made to desensitize the patient to lens protein, and then to remove the cataract by discission followed by simple linear extraction. In an addendum we stated that we had successfully carried out this procedure in a recent case, and it is the purpose of this communication to relate the details of this case.

CASE: Robert S., Hebrew, aged 46, first consulted Dr. Verhoeff, July 18, 1921. The vision of the right eye had been failing for 2 1/2 years, that of the left eye for 2 years. General health, excellent.

Examination: The lens of each eye shows a diffuse opacity in the posterior cortex, but is elsewhere perfectly clear. Both eyes are otherwise apparently normal. The irides are heavily pigmented. V. O. D. = counting of fingers at three feet, unimproved by lenses.

V. O. S. = 20/100; with +3 S. $\bigcirc$ —1 cyl. ax. 60° = 20/30.

General physical examination and urine examination, negative.

Oct. 6, 1921. V. O. S. with correction = 20/50.

Operation upon right eye by Dr. Verhoeff. Intracapsular extraction by capsule forceps, with iridectomy. Scleral suture. The patient proved to be a "bad actor" and squeezed out a considerable amount of vitreous just as the lens was being delivered. After tying the scleral suture, a small pair of scissors was introduced thru one side of the wound and the iris sphincter cut below, to prevent subsequent drawing up of the pupil.

Healing was uneventful, except that on Oct. 29th, the eyelids showed evidence of atropin irritation. The vision utimately obtained was, V. O. D. with +12.25 S. $\bigcirc$ +1. cyl. ax. 23° = 20/15.

Nov. 1, 1921. Intradermal test with pig lens protein was strongly positive.

[The lens protein is prepared as follows: One dozen pigs' eyes are ob-

tained from the slaughter house on the same day the animals are killed. Each eye is then sterilized by exposing it a few moments in a Bunsen flame, and by means of a cataract knife first the cornea and then the lens capsule is incised. The lens is then squeezed out of the eye into a sterile mortar. The latter is then covered with a sterile cloth and the lenses allowed to dry, which requires about 48 hours. By means of a pestle they are then ground to a powder which may be kept indefinitely in a sterile bottle. For use, the powder is added to normal salt solution in the proportion of .33 of the former to 10 of the latter. This corresponds to a 10% solution of fresh lens, and from it the various dilutions desired may be made.

As a matter of fact, all of the lens protein does not go into solution, so that the fluid must be well shaken before being used. If desired .5% phenol may be added, but we have found that the solution is so easily contaminated that in spite of this addition it will not keep even in the ice chest. It is therefore highly important to make it up fresh from the lens powder each day it is to be used. In the intradermal test, .04 cc. of the fluid is injected within the layers of the skin.]

Nov. 9. Intradermal tests made in three dilutions: 1:10 = + +, 1:100 = +, 1:1000 = doubtful.

Nov. 15. Desensitizing intramuscular injections of pig lens protein begun. First injection = 0.4 cc. 1:1000 solution.

Nov. 22. 0.8 cc. 1:1000 solution.

Nov. 29. 0.2 cc. 1:100 solution.

Dec. 6. 0.4 cc. 1:100 solution.

Dec. 13. 0.8 cc. 1:100 solution.

Intradermal test, 1:10 = doubtful, 1:100 = —.

Dec. 20. 0.2 cc. 1:10 solution.

Dec. 27. 0.4 cc. 1:10 solution.

Intradermal tests, 1:10 —, 1:100 = —.

Jan. 4, 1922. 0.8 cc. 1:10 solution.

Jan. 5, 1922. Operation upon left eye by Dr. Verhoeff. Pupil previously dilated with atropin. Discission of lens with small Ziegler knife, a horizontal linear cut being made in the capsule just below the upper margin of the dilated pupil. Knife introduced subconjunctivally. Patient allowed to go home after a few hours, without a bandage.

Jan. 7. Moderate congestion of eye. Lens swollen and cloudy at site of discission, pushes upper pupillary margin upward.

Jan. 16. Pupil well dilated. Anterior chamber almost obliterated by swollen lens and contains a piece of lens matter below. Upper part of iris pushed up out of sight. Tension normal. No pain. Considerable congestion. Operation on left eye by Dr. Verhoeff. Subconjunctival injection of 4% cocain muriat. Conjunctival flap and scleral suture. Large incision with keratome. Most of the lens matter expressed without difficulty. Irrigation with normal salt solution after tying suture. Lens matter seen enclosed in capsule below, not easily washed out and therefore allowed to remain. No iris prolapse at any time. No iridectomy done.

Jan. 17. Anterior chamber partly reformed. Cornea clear. Transparent lens matter visible in lower half of pupil, enclosed in capsule. No pain. Solution hyoscin hydrobromat 1/3%, once daily.

Intradermal test 1:10 = —. Intramuscular injection 0.8 cc. 1:10 solution lens protein.

Jan. 19. Anterior chamber fully reformed.

Jan. 20. Some pain last night. Bandage omitted. Hyoscin 1/3% three times daily.

Jan. 23. Suture removed.

Jan. 24. Congestion much less. No pain. Pupil well dilated.

Feb. 2. Considerable congestion and photophobia but no pain. Pupil about half dilated. Lens matter becoming opaque.

Feb. 25. Photophobia, lacrimation, and congestion marked. Lens matter absorbing very slowly.

Feb. 26. Intradermal test, 1:10 = +.

Feb. 28. Intramuscular injection 0.2 cc. 1:10.

March 6. Definite improvement in congestion and photophobia. Intramuscular injection 0.4 cc. 1:10.

March 9. Congestion, photophobia and lacrimination much less.

March 13. Improvement continues. Intradermal test 1:10 = —. Intramuscular injection 0.8 cc. 1:10.

March 18. O. S., white and quiet. A thin layer of opaque white lens matter remains enclosed in capsule, obstructing lower inner half of pupil. Fundus clearly seen. Injections discontinued.

May 30, 1922, V.O.S. $+12.75 \supset +1$ cyl. ax. 170° = 20/15.

REMARKS.

This case proves conclusively that by repeated injections of lens protein it is possible completely to desensitize certain individuals who are markedly hypersensitive to lens protein, so that lens matter left in the eye after cataract extraction will cause no serious reaction. There seems to be no obvious reason why all individuals hypersensitive to lens protein cannot be desensitized in this way, but a large series of cases will be necessary to determine this with certainty.

Following the discission in the present case the eye became considerably congested, but there were no posterior synechiae or other evidences of definite iritis. Following the linear extraction, the eye remained irritable and congested longer that would ordinarily have been expected, but at no time was there descemetitis or posterior synechiae. To ascertain the duration of the immunity, all injections of lens protein were omitted for about six weeks from the day after the operation. At the end of this time, the eye still showed considerable congestion and marked photophobia and lacrimation. An intradermal test was made which proved positive. The weekly injections of lens protein were then renewed, after which the symptoms of irritation quickly subsided. It is evident, therefore, that the injections of lens protein in such cases should be continued after operation until all signs of irritation in the eye have practically disappeared.

Judging by the present case, it would seem that patients under fifty years of age with immature cataracts may now safely be operated upon by preliminary discission of the lens followed by linear extraction without iridectomy. They should first be tested with lens protein, and if found hypersensitive they should be desensitized. As long an interval as possible should be allowed to elapse between the discission and the extraction, but if considerable increase in intraocular tension should ensue, this interval would, of course, need to be made short.

For obvious reasons all patients over fifty years of age with immature cataract should also be tested with lens protein and immunized if found hypersensitive. They may then, no doubt, be operated upon by the capsulotomy method without risk of a poor ultimate result. Operators experienced in the intracapsular operation may, instead, employ the latter method without fear of unfortunate results should the capsule rupture and a large amount of lens matter be left in the eye. Personally, however, we now hope to be able to dispense with the intracapsular operation in the cases of unruly patients, and to restrict its use to especially suitable cases.

In cases of fully mature and hypermature cataracts, and sclerosed lenses, it would seem to be unnecessary, from a practical standpoint, to test the patients for hypersensitiveness to lens protein, since in such cases very little lens matter is left in the eye at operation.

NEUROPATHIC KERATITIS A RESULT OF FOCAL INFECTION.

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ST. LOUIS, MO.

The views here advanced are that dendritic keratitis and also neuropathic keratitis are caused by lesions of the terminal divisions of the corneal nerves. Illustrations are given showing the form of the nerve terminal branches in the cornea of the dog. A case of neuropathic keratitis is reported, which rapidly cleared up after treatment of subacute ethmoiditis on the side of the affected eye. Read before the St. Louis Ophthalmic Society, March 24, 1922. See p. 736.

In the April, 1904, number of Dr. Alt's AMERICAN JOURNAL OF OPHTHALMOLOGY, I advanced the theory that dendritic keratitis was a terminal nerve lesion; because of the accompanying corneal anesthesia, the shape of the lesion, especially at the beginning, the advancement of the ulcer by new infil-

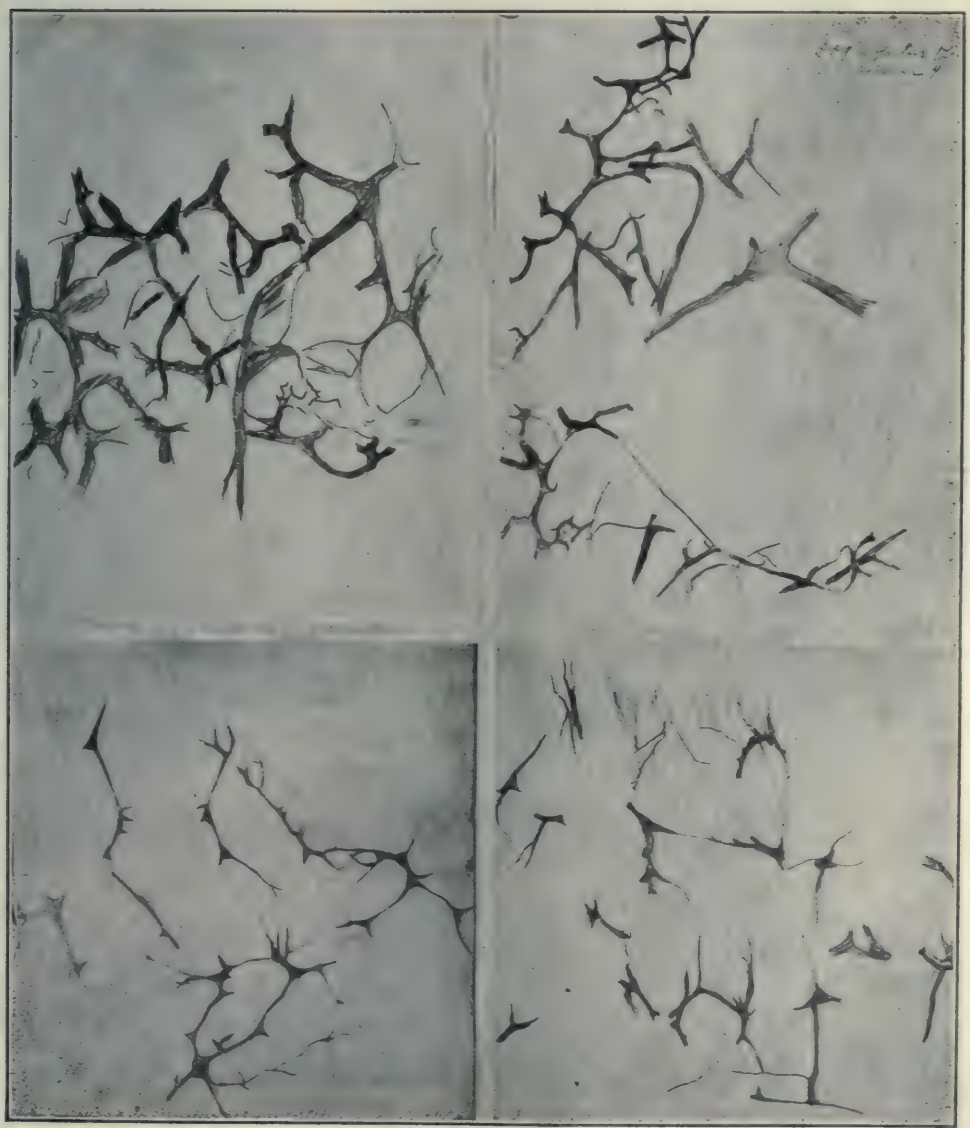

Fig. 1. Photographs of Drawings of the Subepithelial Nerve Plexus in a Dog's Cornea. Made with Zeiss' drawing apparatus. Objective B, ocular 4.

trations as if along the branching of a nerve, and also the extreme chronicity of the disease and the fact that it is seen only during or after those diseases which, when they affect the nervous system, affect the terminal nerves rather than the central nervous system, e. g., malaria, grippe, pneumonia. At that time I reported the case of a man with typical dendritic keratitis who had had grippe; and I contended, that

In order to substantiate the theory that such terminal lesions are possible from focal infections, one needs only to point to the various "neuralgias," without other apparent complication, which have been relieved by suitable treatment of the offending focus.

Dr. W. A. Shoemaker first suggested the idea of such a cause for a neuropathic keratitis, in a case which he accorded me the privilege of seeing sev-

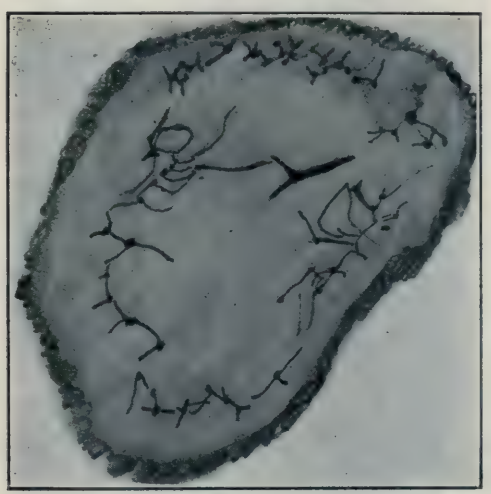

Fig. 2

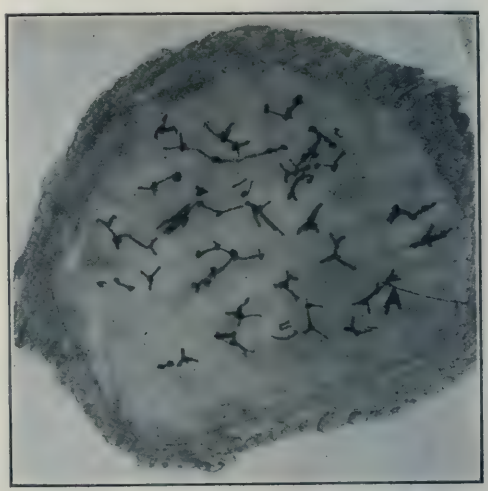

Fig. 3

Fig. 2 and Fig. 3. Demonstrate the Triangular Nodes and Nerve Bundles as Visible to the Unaided Eye. Sections 2 mm. in diameter, magnified 32 diameters. Actual size of A in Fig. 3, 1/7 mm.

while herpes corneæ is vesicular, the typical malarial keratitis is papular and leaves a much more obstinate lesion than results from herpes.

With the Zeiss drawing apparatus for the microscope, I also made drawings of the subepithelial nerve plexus of a dog's cornea, and found that I could reproduce a very convincing combination of appearances of dendritic keratitis by substituting dots and fine lines for the triangular branching nodes and bundles of nerve fibrils, as will be noted in these crude drawings, —not proof but to me somewhat significant. I then proved that if such bundles of fibrils become opaque, or their channels filled with leucocytes, either could be visible to the unaided eye, by comparing them with the finest gossamer, which I was able to quarter mentally under the microscope.

eral months ago, and which he will later describe.

My own patient, a 22 year old girl, of a rather neurotic type, came to me October 12, 1921, with the history that she had had influenza two weeks before, followed by chills and fever five or six times. Dr. J. W. Shaw gave the patient quinine, 3 grains, every three hours for seventy-two hours, and then t.i.d., since which course she has had no chills or fever.

The right eye first began to water and become red six days before I saw her.

Present Condition. There is a small branching ulcer of the cornea, which is accompanied by great photophobia, lacrimation and ciliary injection. On October 21st, the ninth day of treatment, V. R. 23/48 under atropin, em-

metropic. V. L. 23/24, also emmetropic. Treatment consisted in the usual remedies, including iodin and finally mercurochrome, atropin several times a day with holocain, and bandage.

On November 3rd, she was sent to her dentist, who placed her teeth in good order, after having found a right lower third molar badly decayed.

Having exhausted all other methods known to me, on November 16th I referred the patient to a rhinologist, Dr. Roy Scholz, who found a mild suppurative subacute ethmoiditis on the right side, which responded beautifully to palliative treatment. From the time he began to treat the patient daily, by shrinking the sinuses, and by applying mild astringent antiseptics, the eye began to improve,— in fact two days after she was referred the ulcer had healed, altho the ciliary injection lasted some time longer.

Dr. Scholz's letter to me in February states, "When I last saw her I was unable to extract pus from the ethmoids; the mucosa of the entire nose was free from congestion and the patient was entirely free from symptoms."

On December 13th there was only a faint scar remaining, very little photophobia and the vision was: R. 23/24, Em.; L. 23/19, Em.

The patient was last seen December 23rd, and the eye was free from symptoms or signs of disease.

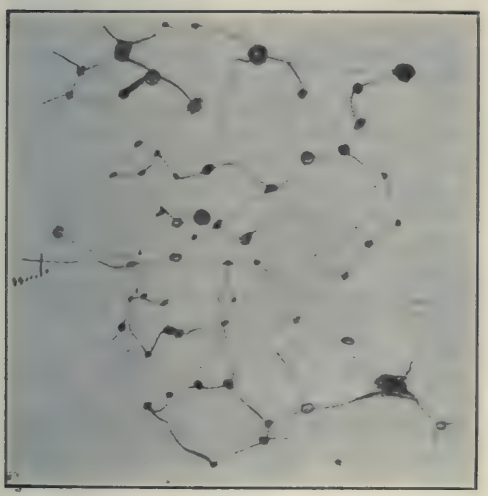

Fig. 4

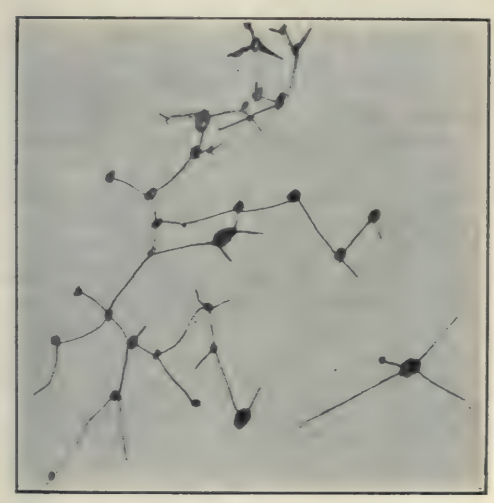

Fig. 5

Fig. 4 and Fig. 5. Dots drawn exactly width of Triangular Branching Nodes which will be Visible to the unaided eye if opaque and under proper illumination. Average width of Fiber Bundles 11.4 micra. Author's unaided eye quarters a gossamer thread 22 micra in diameter.

PERSISTENCE OF EMBRYONIC FIBROVASCULAR SHEATH OF THE CRYSTALLINE LENS.

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The published cases of this condition are here abstracted and reviewed, and two new cases are reported. Its differential diagnosis is discussed. This is important because eyes presenting this anomaly have been enucleated on the supposition they were affected with glioma of the retina. A bibliography is appended. Read before the Indiana Academy of Ophthalmology and Oto-Laryngology at Indianapolis, January 19, 1922.

This paper was suggested by an unusual condition found in a patient who came for relief from poor vision, by the small number of similar cases reported in the literature, and by the possibility of such cases being mistaken for other conditions, especially glioma, unless a careful diagnosis is made.

The embryonic blood supply of the capsule of the lens, according to accounts of Gradle and of Fuchs, shows the following groups of blood vessels, (1) Those given off from the central artery of the optic nerve, which continues as the hyaloid artery toward the posterior pole of the lens, in Cloquet's canal, halfway thru the vitreous chamber, where it separates into 8 or 10 branches of equal size, which spread peripherally in a meshed formation anastomosing freely with one another, and enter the lenticular sheath midway between the equator and the posterior pole of the lens. Each of these branches subdivides rapidly, making of the lenticular sheath a meshwork of fine arteries, which are interspersed by many capillaries radiating unequally in all directions. (2) The central artery of the optic nerve as it enters the eye gives off lateral branches which form an arterial network in the peripheral portions of the vitreous, and extend forward to the margin of the lens, uniting and anastomosing with branches from the hyaloid artery, forming a specially dense network of vessels surrounding the border of the lens. (3) The anterior branches of the long ciliary arteries, which course thru the mesoderm that covers the surface of the iris, bend over the pupillary edge of the iris and assist in covering the anterior capsule of the lens with a vascular network. The course of these vessels as they pass thru the vascular sheath, over the anterior surface of the lens, is not radial, but assumes a finely woven meshwork anastomosing freely with one another. (4) The veins are derived from the circulation of the iris, and are found slightly posterior to, and directed toward the equator of the lens; and provide for the escape of all the blood into the ciliary region and ultimately into the venae vorticosae.

Two areas of the entire lens surface, the anterior and posterior poles, remain comparatively free from vascularization.

The hyaloid system and the tunica lentis vasculosa reach the height of their development during the sixth month of intrauterine life, while in the sixth and first part of the seventh months, the disappearance of the entire hyaloid system occurs by rapid absorption of the vessels accompanied by an equally rapid disappearance of the tunica lentis vasculosa. Failure of the arteria hyaloidea to be absorbed gives the anomaly known as the persistent stump of the hyaloid artery, while permanent remnants of the tunica lentis vasculosa are known as pupillary membrane.

An endeavor has been made to examine the literature pertaining to all the anomalies found in connection with the embryonic blood supply of the fibrovascular sheath of the lens.

The earliest mention of the vascularity of the lens and its capsule is said to have been published by Howard in 1851. DeWecker observed, in an eye with upward dislocation of the lens, an atrophied artery which extended from the papilla forward and upward, and which terminated in a white substance surrounding the lens. He also described an interesting case of persistent canal of Cloquet, terminating in the shape of an S at the posterior capsule

of the lens; but he did not mention a ramification of blood vessels over the lens.

Fournet in 1879 reported a case of persistent hyaloid artery in a soldier 22 years old with external strabismus, who came into the hospital suffering with pneumonia.

Gardiner in 1880 reported a case of persistent hyaloid canal and artery in the right eye of an American, 22 years old, who consulted him for dimness of vision. Extending from the papilla forward to the posterior capsule of the lens, was a white shining cord of about the caliber of one of the principal branches of the retinal artery. At the insertion into the optic nerve, it formed a funnel shaped expansion entirely covering the papilla and its vessels, and extending beyond at the nasal side. The anterior portion formed a similar smaller funnel, attached to the posterior capsule of the lens;—the cord exhibited rhythmic movements and was found to consist of a bright red blood vessel enveloped in a thin translucent sheath, Cloquet's canal. The expansion at the posterior capsule consisted of numerous little blood vessels spreading and ramifying over the posterior polar region of the capsule. Details of fundus could not be made out very well, and the vitreous was somewhat hazy. There were no traces of similar condition in the left eye. Under atropin, vision right eye 20/200, unimproved by lenses; vision left eye 15/200 improved to 20/40, by plus 12.00 sphere.

Holmes in 1881 reported a case of persistent hyaloid canal in an amblyopic right eye, with strabismus, in a child of 17. Vision 5/100. Under atropin the pupil, which was sluggish, dilated only moderately. A central defect in the field of vision was caused by a white object, shaped like a wine bottle with base on the optic disc, with body, neck and head projecting forward almost to the center of the posterior capsule of the lens. At first it was taken for a cysticercus. No drawings published.

Snell in 1883 reported a case of posterior polar opacity of the lens and persistent hyaloid artery in the left eye, in a child of 11 years, with vision of fingers at 1 foot, and a myopia of 8 D. The opacity in the posterior pole of the lens was made up of fine striae in the posterior capsule. Running backwards from the opacity was a light grey translucent hollow cord, attached at the optic disc to a vessel in the center of the papilla, widening out like a funnel, wavy between attachments. No illustration given.

Collins in 1892 gave a detailed anatomic description of the persistent posterior fibrovascular sheath of the lens in three cases, and subsequently has recognized a like number of cases clinically. Collins is quoted by de Schweinitz in 1899 as saying "persistence of the posterior part of the fetal fibrovascular sheath of the lens may be mistaken for glioma."

Brailey and Ormond in 1899-1900 reported a case of probable congenital vascularity of lens capsule, in the right eye of a child 2 1/2 years old. This abnormality was commented upon at its birth by the attending doctor. The mother noticed it "blood shot." At 1 year the child developed an occasional squint. An opacity was found occupying the inner 2/3 of the anterior part of the lens, while the outer 1/3 was almost clear, with some small scattered opaque spots. On the innermost part of the opaque area were several small vessels with minute branches. The opacity was chalky white and had an uneven surface, the pupil eccentric, the iris, broader at outer than at inner side, dilated only moderately under atropin. No illustration given.

Silcock in 1900 reported a vestigial hyaloid artery starting from a macular coloboma in a child of 16 years who complained of short sight in left eye. From the center of a circular macular choroidal coloboma, a connective tissue thread like branch extended forward thru the vitreous, terminating in a fimbriated extremity, which was attached by a thin strand of connective tissue to the posterior surface of the lens capsule, at the lower and inner part.

Middleton in 1919, out of 28 cases of congenital condition of the fundus or

bulb causing a reduction of vision, observed in the examination of 200,000 soldiers, reported one case of complete pupillary membrane, with slight dimness of vision in the right eye, altho vision was stated to be 20/20. The iris was free from adhesions, but there was a thin, congenital, film like membrane nearly transparent, covering the entire right pupil and attached to the iris equally around the whole of the pupil. Examination with a loupe showed a vertical slit 2 mm. wide at center, extending across the pupil, resembling the slit like pupil of a cat's eye, and gradually coming together at each end near the margin of the pupil. Atropin dilated the pupil slightly horizontally but not vertically, while the opening in the pupillary membrane was widened to twice its original width. The distant vision was reduced under atropin to 20/200. The left pupil was free from membrane or pupillary bands. Vision in left eye 20/30.

Lane in 1919 reported two clinical cases, and three eyeballs examined microscopically, with persistent posterior fibrovascular sheath of the lens.

Of the clinical cases, one a child of 14 years, had convergent upward squint since one year of age, with vision in right eye 3/200. Right lens in anterior nasal third of cortex was irregularly opaque at different levels. Opacity continued to the mesial side and involved larger area of posterior cortex. A chalk like opacity was nasally displaced on the vitreous surface of posterior capsule. A long narrow vertical slit thru this opacity showed a red reflex, and from the opacity 5 or 6 narrow, spindle, grayish white striae ran forward and obliquely downward in the nasal direction. A reddish hyaloid artery extended from disc to lens.

The second child, 6 years old, had poor vision and white pupil in the right eye. Vision was limited to shadows, no red reflex. The pupillary and ciliary zones of iris were not definitely demarcated, and a network of delicate pupillary membrane threads stretched across the lower third of right pupil. Under atropin pupil dilated irregularly below, where three short narrow triangular shaped tags of iris appeared to be pulled toward the center by pupillary threads. Completely surrounding the posterior surface of the lens was a glistening uniformly white opacity, on the anterior surface of which was a single tortuous vessel running across the horizontal meridian. Four or five finer vessels taking a horizontal course were below, toward the temporal side. Left eye, vision limited to fingers at 18 inches. Left pupil dilates regularly. An opacity lay back of the upper nasal quadrant and spread out behind the upper one-fourth posterior surface, as a fixed cobweb like network. No fundus details were made out. Refractive error was about plus 6.

The three eyes examined microscopically by Lane were enucleated for suspected glioma. One, a baby of 1 1/2 years with a gray spot behind the left pupil seen by his parents, showed a vascularized white tissue behind the lens, which proved, after the eye was removed, to be a persistent posterior fibrovascular sheath of the lens with patent hyaloid artery attached. In the second baby, when 2 months old, was noticed a discolored pupil in the right eye. At 3 months there was a shallow anterior chamber and a reddish gray reflex, behind the lens. Microscopic examination showed a persistence of pupillary membrane, a persistent fibrovascular sheath of the lens, with a gap in the posterior capsule, hemorrhage in lens and a hyaloid artery. In the third baby, 3 months old, the left lens was seen to be pushed forward on the nasal side, and a gray vascular tissue was situated in the most anterior region of the vitreous. In the removed eye was found a persistent posterior fibrovascular sheath of the lens, with hyaloid artery and a partial irregular development of lens.

More recently several cases were presented before different societies, but illustrations were not published and letters from most of the authors showed none had been made. Schwenk's case was that of a Russian girl, 15 years old, who had poor vision, pain in both eyes after reading and excessive lacrimation. Under a mydri-

atic pupils were irregular. Right eye: Three distinct brown bands were attached to the smaller circle of iris and, crossing the pupil to the opposite side, were adherent to the lens capsule in the pupillary area, appearing like a brown membrane on the lens, almost covering the pupillary area. Vision 20/200, improved to 20/70 by minus 2.50 sphere. Left eye: Four bands crossing from side to side nearly at right angles gave a brownish membrane appearance on lens capsule. Vision 20/70, improved to 20/50 by minus 3.00 sphere.

Shields' patient was a man, 28 years old, born in Russia. Two weeks previous to consultation, he discovered that vision in left eye was practically gone. On the anterior capsule of both lenses was a deposit of minute pigmentary areas, more dense in left than in right eye. In left eye was a fragment of brownish tissue at the margin, which appeared to be a tag of pupillary membrane. Vision left eye, fingers at two feet.

Crisp reported a case of persistent remains of the embryonic system of blood vessels, between the optic disc and the lens in the right eye of a woman of 29 years. Vision, right eye with correction of plus 3.00 S. is 5/10 plus; left eye with plus 1.25 S. is 5/3. The remains appeared as a black strand, wavy and fairly mobile, extending completely from disc to posterior pole of lens.

Suker presented a young man with a persistent hyaloid artery and a fusiform aneurysm of the superior temporal retinal artery in one eye. There were three distinct motile branches, 3-5 mm. in length, on the temporal side of the disc, attached to the main trunk of the remains of the hyaloid artery, which was fixed and 5 mm. long. On the superior temporal retinal artery were seen several fusiform dilatations about 5 mm. long. Vision, normal.

In recently abstracted literature, three additional cases are cited. Takao saw a patient with pupillary membranes in both eyes. The membrane was on a plane with the anterior surface of the iris, with an opening in the middle in front of the true pupil.

Axenfeld reported a case of movable pupillary membrane in a young man having diminished vision in a bright light. Pupils were slightly irregular, with a greyish color in the pupillary areas, which disappeared on looking up. Lateral illumination showed a pupillary membrane thrown into folds when contracted, which became smooth and transparent on dilatation of pupil. The membrane was attached to the posterior surface of iris.

Perry had a case with normal vision, in which a remnant of the hyaloid artery was attached to posterior capsule of the lens and ended in the vitreous.

Rumbaur in 1921 described star shaped remnants of the pupillary membrane in the anterior lens capsule. These could be seen under magnification of 60 or 70 with strong illumination. According to Rumbaur, the star shaped formations occur in 35% to 40% of all individuals, of which 2/3 show the anomaly in both eyes, and in persons of all ages, 5 years to 72 years, decreasing in frequency with increasing age. They occur with other anomalies found at birth and often with other remnants of pupillary membrane, with which they seldom stand in direct relation. Defective vision on account of them seldom occurs, because of their peripheral location. He also gives references to several articles in German literature dealing with pupillary membrane. These have not been seen.

REPORT OF CASES.

Case 1. Mary H., aged 7, referred May 5, 1921, by school nurse, because of inability to see blackboard.

Vision in each eye 20/100, not improved by lenses. Retinoscopic examination under homatropin cycloplegia, alone or with minus or plus lenses, failed to show movement of shadow across the pupil, altho the red reflex was quite distinct. The trial case test gave no improvement in vision. The ophthalmoscope revealed the following picture. Fundus in either eye seen with difficulty, but apparently normal.

On examination of the right eye, with plus 20 behind the aperture, a

fine meshwork of thread like lines appeared to cover the central part of the lens, with an occasional small nest like terminal dot surrounded by meshwork. In the left eye, with a plus 20 behind the aperture, a similar meshwork was seen, but with larger and more prominent, dark, nest like spots and larger portions of the lens clear. No remnants of hyaloid artery could be seen in either eye. A 1/2% atropin

Fig. 1. Appearance of blood vessels in fibrovascular sheath of lens of right eye of case 1 described in text.

solution was instilled three times a day for four successive days, at home, and again an effort was made to improve vision from the trial case, but without success.

The complete dilatation of the pupils showed additional thread like meshwork around the periphery of the lens in either eye, which had not been seen before. In either eye the central meshwork seemed to branch from a main stem, which was thickest at the lower edge of the lens. In and surrounded by the meshwork, were the small round nest like spots, more prominent in the left eye. The fine meshwork around the periphery of the lenses seemed to have no connection with the larger central masses, and did not reach more than one-fourth distance across the lens. Drawings were made with the child in the recumbent position, looking up at the ceiling or fixing a finger held two feet directly above one eye. Nothing of importance in the family history could be obtained. The patient is the oldest of three children and the only one unable to see well. The mother and one younger child were examined and had apparently normal eyes. The father and other child could not be obtained for examination.

Case 2. Mrs. C. brought her small daughter because of impaired vision. History: The mother, had an undeveloped right eye, a defect which she feared might have been transmitted to her child. Examination of this eye

Fig. 2. Appearance of blood vessels in fibrovascular sheath of lens of left eye of case 1 described in text.

under 4% cocain mydriasis showed a marked opaque fibrovascular sheath, with minute blood vessels radiating from it. She stated this was noticed at birth. During infancy and childhood, the eye was carefully watched for inflammatory symptoms and blindness. She has peripheral vision of large objects. She could not be persuaded to sit for a drawing of the anomaly.

DIFFERENTIAL DIAGNOSIS.

Brief differential diagnosis between glioma of the retina and persistent fibrovascular sheath, and between cysticercus of the vitreous and either persistent hyaloid artery or persistent fibrovascular sheath, may not be out of place.

Glioma of the retina occurs most frequently in children, usually under five years, most often involving one eye, altho bilateral cases have been reported. There is noticed first, a bright, whitish or golden yellow reflex from the pupil and a lack of vision. Under focal illumination a light colored nodular mass behind the lens covered with

minute vessels is seen. At first there are no inflammatory symptoms, only the light colored reflex and the blinding of the eye. It is at this stage that a persistent fibrovascular sheath may easily be mistaken for it.

As gliomas grow rapidly and persistent fibrovascular sheaths remain stationary, careful measurements will determine the diagnosis. Glioma, if seen early, when it is small, is visible thru the naked aperture of the ophthalmoscope, while a fibrovascular sheath requires a plus 16 to plus 20 lens to bring out the remnants of the minute blood vessels connected with it. These two points alone would serve to differentiate between glioma and persistent fibrovascular sheath.

Hyaloid artery with a funnel shaped extremity with its rythmic movements may be mistaken for *cysticercus* in the vitreous, as in Holmes' case. The parasite appears as a bluish white, bottle shaped bladder, if head and neck are extended, or as a brilliant white spot, if head and neck are withdrawn. The head in early cases moves actively. If this is extended, there may be seen one of the four suctorial discs and a crown of from 2 to 20 hooklets. If of long duration, opacities of the vitreous form around it, and it appears as a dense white mass. At this time it may be mistaken for a persistent fibrovascular sheath. In cysticercus infestation vision is finally lost, but in persistent fibrovascular sheath vision, altho reduced, remains unchanged. The diagnosis of a cysticercus from a persistent hyaloid artery can be made by the hooklets on a moving head; while the persistent fibrovascular sheath may be diagnosed by the strength of the lens necessary to see the latter, the amount of vision remaining and absence of inflammatory symptoms.

In closing we would suggest a systematic reporting of all similar cases, with drawings if possible, that a knowledge of their prevalence may be obtained; that a more careful differential diagnosis be made to eliminate the tragedy of enucleation in questionable glioma and cysticercus, and a more detailed study of lens capsule in both diseased and normal conditions along lines suggested by Rumbaur.

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REMARKS ON REFRACTION.

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The importance of exact correction of errors of refraction is here pointed out. The necessity of recognizing different types among these patients is mentioned. The value of cycloplegics and their absolute necessity in measuring the refraction of some cases are dwelt upon.

That the human eye unaided cannot stand up under the demands of modern life is evidenced by the increasing numbers of persons who are wearing glasses; and by the tremendous increase in the optical stores to supply such a demand.

Refraction of the eyes, careful and thoro refraction, is, in many cases, a difficult and complicated affair; and one often wonders why people consider their eyes so lightly that they will permit an inferior sort of treatment that they would never dream of having accorded to any of their other members.

Perhaps, in a way, oculists have been to blame to the extent that they have not as a class given the work the care and attention that it really needs; so that the laity, and perhaps the medical profession generally, have come to consider the correction of errors of refraction as quite a minor affair, one that can just as easily be attended to by the advertising optician on the street as the trained oculist in his office.

Probably the truth is that there is room and need for both the fitting optician and the measuring oculist. There are a great many people who have so great an amount of eyestrain, that almost any correction at first will bring some relief. And these people might just as well have an optician fit them at first; because in the life of most people who are compelled to wear glasses, there will come a time when such help will prove unavailing, and then some one must be found who knows how to do a thoro refraction, and will be interested enough to take the time and care to do it. But the objection is that usually these people who have purchased glasses and not service often underrate the value of the services of a competent refractionist; so that of itself alone, refraction is not a good economic business, unless it can be supplemented by the better paying specialist work. People are often willing to pay more in the aggregate for having inflamed eyelids treated than they would pay in a lump sum to an oculist who would do a first rate refraction, correcting the underlying eyestrain, and at the same time curing the symptom, the inflamed lids.

Patients who go to an oculist who practically devotes himself to refraction, must find something more than a refractionist. The oculist must be in addition a well trained physician; because if any one expects to be first rate he will certainly have to see a great deal more than the retinoscope reveals to him. The ciliary muscles are often as contrary as some human beings; and a study of the part necessarily means a study of the whole.

They told me in college that the optic nerves are really prolongations of the brain itself; and that probably accounts for the many psychic and nervous phenomena that may be observed in many eyestrain patients by a trained physician. This means, of course, that one must not lose sight of the patient himself when one attempts to adjust his defective refractive system.

It is also a matter of comment in many cases of considerable refractive error, in patients of good physique and well balanced nervous systems, how little complaint is made, the trouble usually being stated as difficulty in reading the badly printed numbers in the telephone directory or in reading the newspapers. There are here no complaints of headaches, pains around the eyes, etc. And yet in people of the nervous type, without the same robust physical health, the smallest amount of eyestrain, even a quarter of a diopter of astigmatism, will produce

symptoms that are pronounced and very annoying. Which goes to show that the type of patient must be considered in any examination of the eye.

To illustrate: Mr. H., age 53, complains of difficulty in reading his paper; this has bothered him only for the last couple of months, but he finds he can read fairly well in a good light. He has never worn glasses, nor ever had any sort of discomfort with his eyes. Examination revealed that even the largest Jaeger type was blurred; and he really needed a telescope to read the newspaper at the distance he had to hold it from his eyes in an endeavor to see the type.

Under drops the correction was:

R. W. +1.00 ⌒ +0.25 cy. ax. H. =16/13.

L. W. +1.25 ⌒ +0.25 cy. ax. V. =16/13.

With correction for near:

R. W. +2.00 ⌒ +0.25 cy. ax. H. =p.p. 10 1/2-11″.

L. W. +2.25 ⌒ +0.25 cy. ax. V. =p.p. 10 1/2-11″.

About +1.25 less than most men at his age require for this range. To show the opposite type:

Miss S., age 18, student, complains of headache, blurring vision, and of being nervous. V.R.=16/13; L.=16/20 minus.

Under drops the correction was R. and L. +0.25 cy. ax. H.=16/13 and p.p. 3-3 1/2″.

With this correction all the symptoms subsided, and she has continued her studies with perfect relief from any discomfort.

THE QUESTION OF MYDRIATICS.

If all the oculists had the same mental make-up, there would then probably be only one opinion on the subject of mydriatics in refraction. But with different mental attitudes and different experiences, there cannot be any unanimity of opinion. Therefore, each oculist must settle the question for himself. I was trained to the use of a mydriatic in refraction, and a long and varied experience has not changed my method, but rather extended its use. The impression prevails that a mydriatic is usually not required after forty years of age. But it astonished me what poor results I obtained until I began to use homatropin in the eyes of people beyond middle life, even up to the age of sixty.

The idea that the muscles of accommodation of children and young adults are difficult to relax, and that beyond forty years of age they are easily paralyzed by a mydriatic, I have had to revise in the light of my experience, until I have come to believe that age has nothing to do with it. It is the type of person, the character of the refractive error, and the sort of work to which the brain and the eyes are subjected that count. One will find spasms of the muscles, under the influence of homatropin, when fitting glasses, just as readily in a person of fifty as in a child of five. And recently in a woman of fifty-eight I noticed the same thing—that homatropin does not paralyze completely the muscles and iron out the spasm of the muscles at the first treatment with it.

It is my belief that no eye can be completely and finally fitted with glasses at the first and only sitting. In young children, who have not yet had the time and the use of their eyes to develop hypertrophied muscles, homatropin or atropin relaxes them sufficiently to enable one to do a first-rate refraction. But as the eyes develop with the body, there will be changes as time goes on that will necessitate a change in the glasses. In adults, young and old, who have never worn glasses, or have worn improperly fitting ones, it has been my experience, that after the first correction it is usually necessary a few years later (sometimes much sooner) to repeat the examination. And even this may have to be repeated after a further lapse of time, to finally gather up all of the slack that the hypertrophied ciliary muscles have grudgingly let go, until the lenses practically do all of the work and place the eyes almost in a state of rest when looking off into distance. Let me illustrate:

Mrs. G., age 27, complains of headaches, blurred vision. Was fitted by an optician, who changed the lenses

three times in the month. V.R. and L.=16/25, August, 1910.

Under drops the correction was:

R. +0.50 ⌒ +0.50 cy. ax. 75°=16/13

L. +1.00 ⌒ +0.50 cy. ax. 75°=16/13

I deducted + 0.50 sphere from the above, which gave her excellent vision and relieved her symptoms. It was noted on my record that the muscles were not thoroly relaxed by the homatropin. This patient returned about three years later, and told me that she had been perfectly free from any symptoms until within the last three months, when the headaches began again.

Under drops the correction was:

R. +1.00 ⌒ +0.50 cy. ax. 75°=16/13.

L. +1.00 ⌒ +0.50 cy. ax. 75°=16/13

A deduction of +0.25 sphere was made and the correction given. On this occasion, too, there was some spasm of the ciliary muscles.

Four years after this, she again returned with the same report—headaches commencing again.

Under drops the correction was:

R. +1.25 ⌒ +0.75 cy. ax. 75°=16/13.

L. +1.25 ⌒ +1.00 cy. ax. 75°=16/13.

Deduction of +0.25 sphere was made from the above. Two years later the patient reported that she had had no further trouble. At this last examination the muscles were thoroly relaxed by the homatropin. Seven drops of a two per cent solution of homatropin were used, at intervals of ten minutes, in each eye for the three refractions; and the method and the care used were the same on the three occasions.

From this experience I set up the hypothesis that the eye muscles are like the skeletal muscles in the beginning of life, soft and easily tired, until time and exercise bring increasing strength and resistance to fatigue. Just as the athlete has greater strength and endurance from the hypertrophied muscles developed by his training and the greater use of his muscles, so the child who has considerable refractive errors to overcome must work his eye muscles in the same manner that the athlete exercise his skeletal muscles; and consequently gets the same results —hypertrophied muscles that have great strength and endurance, and consequently are not easily relaxed.

As the strength and endurance of these muscles begin to wane, there will come symptoms of tiring with the accustomed work, and it then becomes necessary to take up the extra work, that the eyes can no longer do without tiring, by putting on lenses. As the muscles get accustomed to doing less work than formerly the glasses will become indispensable, and the patient will tell you that he can no longer use his eyes without the glasses. When this takes place, it will not be a great while before it will become necessary again to relax the muscles and take up the residual work that the muscles are doing, to get normal distance vision. When this result is obtained, then, and not until then, is the eye placed in a condition to see in the distance without using the accommodation, the ideal aimed at by the oculist.

Following out this line of thought, it would show that exhaustion would overcome the weak and the ailing first, and in the strong might be put off to a period well into middle life, or even beyond. And such is the case. In childhood after a debilitating sickness, it is noticed for the first time that the child has eyestrain, and examination will reveal considerable refractive errors, that had been present all of the time, but became apparent only when the weakened condition of the child made it impossible for it to waste the energy that it had formerly done, by reason of its improperly adjusted refractive media. Adults, of good physique, or by reason of the fact that they do not use their eyes for any exacting work, often go well into middle life, until the increasing presbyopia added to the static refractive errors begin to draw the patient's attention to his eyes, and he realizes, perhaps when he is about fifty years of age, that he will have to wear glasses if he wishes to read his paper in comfort. Such people as these often boast to one that neither of the parents ever wore glasses, and that they had excellent distance and near vision all of their lives.

To illustrate the uselessness of fitting glasses on some patients without the use of a mydriatic, the following example will show: This patient was fitted by an oculist who had assured me that he never could see any reason for relaxing the muscles, and that neither he nor his patients had any reason to complain about his method.

Mr. W., age 31. Complained of headaches every afternoon; went home exhausted after his day's work. He was wearing:

R. +1.50 ⌒ +0.25 cy. ax. V.
L. +3.50 ⌒ +0.50 cy. ax. 75°.
Under drops the correction was:
R. +4.25 ⌒ +0.50 cy. ax. 75°.
L. +5.25 ⌒ +0.75 cy. ax. 105°.

A deduction of +1.00 sphere from the above gave him excellent distance and near vision; and his symptoms disappeared.

To illustrate the necessity of using a mydriatic at middle life and beyond:

Dr. B., age 56. Wearing:
R. +1.75 S.
L. +0.87 ⌒ +0.62 cy. ax. 145°.

Tho fitted by a number of oculists, had never had his eye muscles relaxed. Complains that his eyes bother him so much that he cannot attend to his work.

Under drops the correction was:
R. +2.00 ⌒ +0.25 cy. ax. 15°.
L. +1.00 ⌒ +1.50 cy. ax. 165°.

A deduction of +0.25 sphere from the above for distance, and a suitable addition for near gave him instant relief.

Dr. Y., age 54. Wearing:
R. +1.25 ⌒ +0.25 cy. ax. 90°.
L. +1.75 ⌒ +0.25 cy. ax. 180°.

States that he has never had his eye muscles relaxed. Is so exhausted after a day's work that it takes the joy out of living.

Under drops the corrections was:
R. +1.50 ⌒ +0.75 cy. ax. 30°.
L. +2.00 ⌒ +0.75 cy. ax. 165°.

This physician reported to me the other day that he had never realized before what comfort and joy properly fitted glasses could give to one..

Mrs. P., age 58. Reports that she has always had strong eyes, that she used them without any thought or care. Has been wearing a pair of glasses for near work, which she picked up in some cheap store. For the last two months, the right eye has watered a great deal, and has bothered her so much for the past week that she could not read. The manifest in the right eye was: R. +0.75 ⌒ +0.50 cy. ax. 145°=16/40. But there was so much spasm of both eye muscles that it seemed a waste of time to bother this way.

Under drops the correction was:
R. —0.25 ⌒ +2.25 cy. ax. 75°= 16/13.
L. +1.00 ⌒ +0.50 cy. ax. 105°= 16/13.

The lenses given to her gave her perfect distance and near vision.

It is my belief, then, that refraction does not receive the attention that it really needs. That while there are a great many people, particularly in childhood and youth, who will find comfort in almost any refraction; yet the fact remains that a day will come when even these will have to seek some one who will refract them properly. That to refract properly, it is necessary in every case where there is spasm of the muscles to use a mydriatic *without any consideration for age.* That it is people around middle age and beyond who have the most trouble from refractive errors; and in order to overcome their discomforts they require the utmost care and attention, which, without the use of a mydriatic, will often prove futile and unavailing.

PRACTICAL SUGGESTIONS ON REFRACTION.

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This paper details the method of taking the history and examining patients who come for relief from errors of refraction. It includes points to be particularly inquired into and methods of testing for the refractive error.

The work of the refractionist does not by any means consist of the mechanical examination of the eye with prescription of glasses. If properly done, it must take into consideration the numerous complexities which enter into the causation of ocular symptoms, whether local or general. All cases with ocular symptoms are not for the oculist; all ocular cases are not necessarily for prescription of glasses. Thus every case is a problem which must be solved, before any attempt to prescribe is made.

In taking the history, the following questions must be carefully gone into: Age, ocular symptoms, general health, amount of ocular work, conditions under which the work is done, the patient's habits, vision, condition of the ocular muscles (external and internal). A careful search for any pathologic changes should be made.

Age. *Hypermetropia.* A healthy young individual may easily overcome a slight error without any eyestrain. Even a greater error may be overcome with or without symptoms. A very great error is generally accompanied only by poor vision (as no attempt constantly to correct is made). In the older patient, a slight or moderate error is corrected with symptoms of eyestrain. A greater error results only in poor vision, on account of the loss of power of accommodation. Presbyopes will get eyestrain, if they try to read without glasses, particularly in the early stage of their presbyopia, or when wearing too strong a correction.

Myopia. Myopes do not generally suffer from eyestrain, unless they have marked astigmatism, or when wearing an overcorrection. Myopia decreases with age. This is due to sclerosis, or flattening of the lens. High grade myopia may be progressive.

Ocular Symptoms. These consist of burning, itching, tearing, conjunctivitis, blepharitis, supraorbital pain, fronto-occipital pain, temporal headache, rarely unilateral headache, gastric symptoms, vertigo, blurring of vision after prolonged reading, etc. Other causes for headache must be carefully considered. These may be: supraorbital neuralgia, sinuitis, gastrointestinal disturbance, anemia, cardiac disease, arteriosclerosis, uterine disease, alcohol, tobacco, bad atmospheric condition, etc. Headache caused by the eyes generally comes after use for near work, cinema, theater, shopping, etc. The headache is more frequent in the afternoon or evening. Rarely, the headache may not come till the next morning. Sometimes, in the presence of a marked error of refraction, the headache may be constant.

General Health plays an important rôle in refractive errors. A patient may never feel any eyestrain until his general condition is below par. Glasses will relieve his eyestrain, but are frequently discarded when his health improves. Hypermetropes in good health require less correction than those in poor health.

Amount of Ocular Work. A good deal of near work, such as reading, writing, sewing, embroidering, will cause eyestrain even in the presence of a small hypermetropic error. In distant vision, driving an automobile, watching motion pictures, etc., will often be followed by eyestrain.

Conditions Under Which the Eyes Are Used will contribute toward the etiology of eyestrain. Thus: poor light, artificial light, light coming from the wrong direction, glaring light, habit of holding the work too close to the eyes, reading of very small print.

Vision. Good vision means emmetropia, hypermetropia of slight or moderate degree, slight myopia, or moderate astigmatism. Poor vision means myopia, marked hypermetropia, or

marked astigmatism. In older patients even a moderate hypermetropia may cause poor vision.

Condition of Ocular Muscles. This takes in principally exophoria, insufficient power of convergence, insufficient power of accommodation (asthenopia). In myopia exophoria is practically always present, but in spite of that, there is good power of convergence. When exophoria is present in the hyperope, convergence is generally insufficient. Such a condition may cause eyestrain and headache, which glasses will not correct, unless the exophoria is corrected by prisms or preferably by convergence or prism exercises. Hyperphoria will often cause headache, in spite of proper correction, unless a prism is used.

Pathologic Changes may account for poor vision and should, therefore, be carefully searched for. The most important of these are: opacities of the cornea and Descemet's membrane, changes in pupillary reactions, presence in the pupillary area of exudate on the anterior capsule of the lens, lenticular cataract, opacities in the vitreous, diseases of the choroid and retina, particularly in the region of the macula, diseases of the optic nerve. In the absence of evident pathologic changes, we must not forget toxic amblyopia, incipient glaucoma, congenital amblyopia and amblyopia ex anopsia.

Manifest Refraction. Examination of this is generally satisfactory in patients 40 years of age, or over. In younger patients, if starting with poor vision, we are able to get perfect vision with correction, it may not be necessary to go any further, prescribing the result of our manifest examination.

In *myopia* prescribe the weakest sphere that will give 20/20 vision with both eyes. In the presence of slight symptoms of eyestrain, with good vision, an *astigmatism* correction, especially when against the rule, may prove satisfactory. When no astigmatism is present, only apparent *hypermetropia*, retinoscopy should be resorted to; as also in all cases with marked symptoms of eyestrain, and when the manifest examination fails to give a satisfactory result. Children with poor vision or ocular symptoms should be retinoscoped after atropin has been used for three days.

The ophthalmometer is a useful guide in cases of astigmatism. It will indicate with fair accuracy the axis of the cylinder. 0.75 seems to be the normal ophthalmometer finding for a normal cornea. 1.00 should indicate 0.25 with the rule; less than 0.75 would indicate astigmatism against the rule. It is a safe rule not to give a larger cylinder than the ophthalmometer indicates. Occasionally with a normal ophthalmometer reading (0.75) retinoscopy will show a slight lenticular astigmatism (0.25 to 0.50). Sometimes a high corneal astigmatism is counterbalanced by lenticular astigmatism and practically no astigmatism is indicated by the manifest examination or retinoscopy.

Retinoscopy. The degree of hypermetropic correction depends on the intensity of the symptoms and the age of the patient. The older patient requires more correction. The correction may vary from 0 to full correction. When in doubt make a postretinoscopic examination, particularly for near vision. Young hyperopes have strong power of accommodation, some of which they should be allowed to retain. The amount of correction should be in proportion to the degree of eyestrain and the amount of near work.

Full correction is given in the presence of convergent squint and when vision is poor owing to the loss of power of accommodation. The younger and healthier the patient, the less correction is required. Once a full correction is given, the patient becomes too dependent on his glasses. Patients with exophoria and weak convergence, if hypermetropic, should be given a weak correction until the exophoria is corrected by exercises, etc.

Presbyopes with exophoria should not be given a strong correction, and should be satisfied with a near point of 16 to 18 inches. Exophoria in presbyopes who have not used any glasses,

or who have worn very weak correction, results from nonuse of convergence. Too much correction in the beginning will cause distress. In mixed astigmatism, correct vision first with cylinder; then, if a minus cylinder was used, treat the case like a hypermetropia; if a plus cylinder was used treat the case like a myopia. We choose the cylinder which will leave the weakest sphere to be used. Sometimes the sphere may be dispensed with.

TRIAL FRAMES FOR BASE LINE REFRACTION.

SIDNEY L. OLSHO, M.D.

PHILADELPHIA, PA.

The frames here described are designed to make effective the coordination of refraction with spectacle eyeglass fitting.

The logic of refracting with perfect trial lenses held in a definite position, which predetermines the position of the finished spectacle or eyeglass lenses, should appeal to every refractionist. The futility of making fine differentiations in focus or axis under any other conditions is self evident.

I submit illustrations and a description of the mechanically perfected model of the trial frame described by me, in the AMERICAN JOURNAL OF OPHTHALMOLOGY, July, 1920, Vol. 3, No. 7.

This trial frame is not the end but the means by which refraction is definitely coordinated with spectacle and eyeglass fitting. I wish to reiterate certain principles of this coordination so that the underlying purposes of the frame may be grasped, and so that this system may be universally understood and adopted.

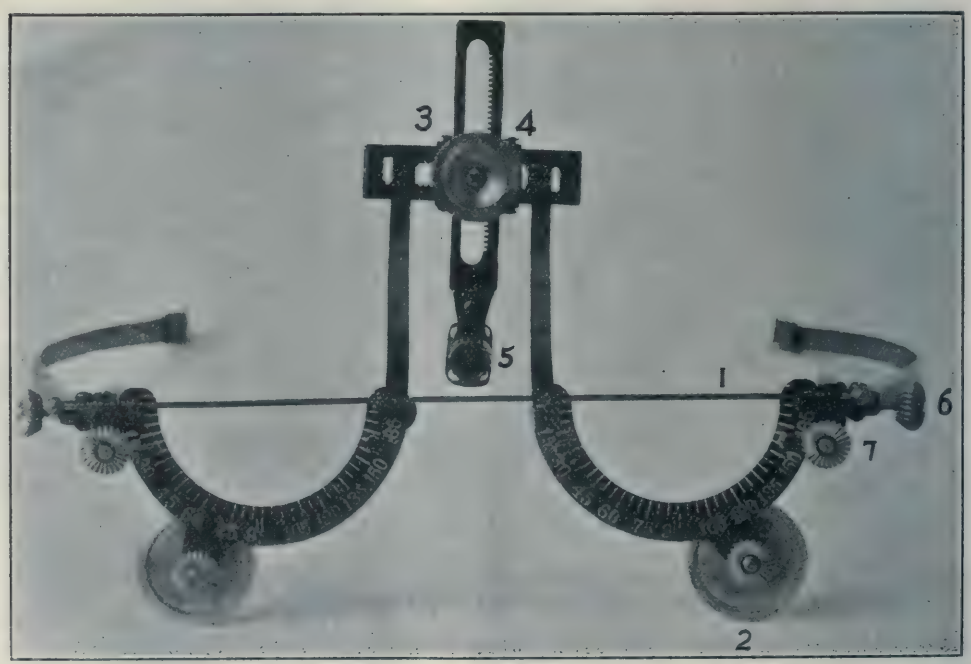

Fig. 1. (1) The 180 degree markings appear on both temporal and nasal sides for each eye, all four on one continuous line, as shown by the long horizontal rod resting on four supporting pins. (2) Grooved friction wheel to rotate trial cylinders. (3) Wheel for centering trial cells. (4) Wheel for raising or lowering perforated, conforming nose rest. (5) Set screw for positioning nose rest forward or back. (6) Knob, one for each temple, controlling its spread, securing even tension on both sides of the head and equal distance of both cells from the eyes. (7) Knob for delicate control of the new, separately adjustable tilting temples. Tilt one temple only and the corresponding end of the trial frame is raised. Tilt both equally and the trial frame is tilted forward from the top to the desired angle.

I. The trial frame front is rigid.

II. A horizontal test rod, resting on four supporting pins is used to make certain that the four marks, indicating the 180 degree meridian of the frame, are all on one line.

III. Two centrally beaded short horizontal rods are used when the trial frame is adjusted on the patient's face. The trial frame is so positioned that each rod is opposite one of the external canthi of the patient. (The internal canthi are disregarded.) This brings the horizontal meridian of the frame directly opposite the horizontal meridian of a patient's face, viz., a line extending from external canthus to external canthus. This is the *Base Line* from which all axes are worked off.

IV. The straight temples are delicately yet firmly and separately adjustable as to tilt at any angle, and as to lateral pressure by four adjusting knobs, two on each side of the frame. Tilting both temples equally tilts the plane of both trial lenses. Tilting one temple more than its fellow raises the corresponding temporal end of the trial frame. (The lowering of one cell independently, as is done in some trial frames creates an almost insurmountable incoordination between refraction and spectacle and eyeglass fitting. See Fig 7, page 485, Vol. 3, A. J. O., July, 1920.)

V. Thin spherical and cylindric test lenses, exactly centered, are used. The axes of the latter are distinctly marked *on the lenses* at *geometrically* opposite points. When placed in the trial frame at the 180 degree axis—both marks on each cylindric trial lens are seen to hit off correctly with two 180 degree marks on the trial frame, thus verifying the markings each time a cylindric test lens is placed in the trial frame. The trial lenses are large, the diameter of the cells being 38 millimetres. (The use of a small cylindric lens is equivalent to working with a very short arc. The movement of such a lens over a five degree arc represents a very minute excursion. The movement of five degrees of the larger lenses is an appreciable and discernible excursion.)

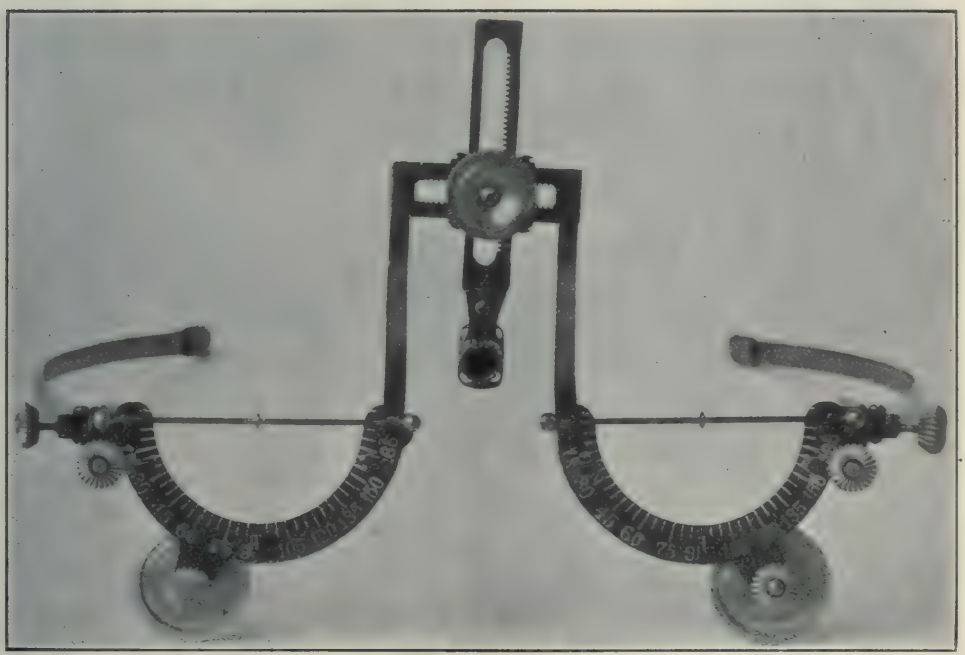

Fig. 2. Each one of the short horizontal rods should be opposite an external canthus when frame is correctly levelled on the patient's face.

As has been mentioned, the straight line crossing the four 180 degree markings on the axis scales of the trial frame, is brought exactly opposite to a straight line crossing the two external canthi of the patient. Subsequently, glasses are so adjusted that a straight line, white pencil marked across the entire horizontal meridian of a pair of spectacles or eyeglasses, is brought into the identical relation to the external canthi of the patient.

As to Height: The refraction is done with the centers of the trial lenses placed on a level with the external canthi. Subsequently, a pair of spectacles or eyeglasses is adjusted so that the optical and geometric centers of the correcting lenses are at the identical height.

As to Tilt: Refraction is done with the planes of the trial lenses tilted at an angle parallel to the orbital aperture (i. e., to a line extending from the

Fig. 3. When one ear is higher or the face asymmetric, it becomes necessary to tilt one temple more than the other to bring the continuous horizontal line of the trial frame front opposite and parallel to the line extending from external canthus to external canthus.

Fig. 4. When both temples are tilted equally, the plane of the trial frame front is tilted forward from the top to the desired angle.

center of the upper, sharp, thin, bony rim of the orbit, to a corresponding point on the lower, sharp, thin, bony orbital rim). Subsequently, a pair of spectacles or eyeglasses is adjusted so that the planes of the correcting lenses have the identical tilt.

My reasons for arbitrarily selecting two lateral fixed points (the external canthi) on the patient's face as determining the horizontal meridian of that face, are fully set forth in the article previously mentioned. These with the other fixed points which guide the oculist in adjusting the trial frame and subsequently his optician in adjusting the glasses, make possible the coordination of refraction with spectacle and eyeglass fitting.

HYSTERIC HOMONYMOUS HEMIANOPSIA.

JOHN L. GARVEY, M.D.

ANN ARBOR, MICHIGAN.

The case here reported was observed in the Clinic for Neurology, Hospital of the University of Michigan. Its symptoms, history and subsequent course seem fully to justify the diagnosis indicated in the title.

It is generally conceded that hemianopsia caused by hysteria is a rare condition. Wilbrand and Saenger[1] go so far as to say, "With the greatest certainty we can assert that neither central scotoma nor temporal or homonymous hemianopsia can be caused by hysteria or considered as a symptom of a purely functional neurosis. These three are always the direct or indirect result of organic lesion." According to Wilfred Harris,[2] cases of hysteric homonymous hemianopsia have been reported by Svynos, Galezowski, Rosenthal, Westphal and Bonnefoy. Harris reports a case of left homonymous hemianopsia as a period in the clearing up of the ordinary hysteric amaurosis which quite coincides with the observation of Pierre Janet.[3]

The case that I have to report is that of a woman admitted to the University Hospital on the 13th of September, 1921. She was twenty-six years old, married and a waitress by occupation. Her chief complaint was loss of the left half of the field of vision. The family and previous medical history were practically negative. In April, 1921, she was hit over the right eye by a swinging door. This blow did not render her unconscious and she suffered little pain. There was no dizziness or vomiting, at this time, and she continued her work. In June, 1921, she began to have pain over the right eye with dizzy spells and vomiting. Two days following the onset of pain she noticed that she could not see objects in the left half of the field of vision. This condition remained about the same.

Examination showed a well nourished woman who replied to questions promptly and intelligently. She seemed mentally normal. During the examination she cried considerably, held her breath and was quite concerned over her condition. There were numerous stigmata of deviation. Her gait and station with the eyes open and closed were normal. There was a medium fine tremor of the hands on extension, and she developed a tremor on the finger to nose test. There was no paralysis of the face, tongue or extremities. The pupils were equal, round and symmetric. They reacted to light and in accommodation. There was a suggestive transitory nystagmus on lateral deviation of the eyeballs.

The tendon reflexes were all present, prompt and equal on both sides. She felt pin point plainer on one side than on the other, the change coming in the midline. There was no anesthesia of the conjunctivae, but glove and stocking type of analgesia to pin point. The examination of the lungs, heart and abdomen was negative. Examination in the Otology Clinic (Dr. R. Bishop Canfield) was reported negative for objective signs in the nose and throat.

Bárány tests showed no localized lesion. Examination in the Ophthalmology Clinic (Dr. Walter R. Parker) showed the fundi to be practically negative, except for slight endarteritis and slight edema of the retina. The visual fields showed left homonymous hemianopsia. See figure 1.

An X-ray of the head showed the sella turcica to be well outlined, normal in appearance, with no evidence of recent or old fracture or other abnormal appearance. A Wasserman test on the blood was negative. The blood pressure was 110/90 and the examination of the blood and urine was essentially negative.

Fig. 1. Fields of vision showing homonymous hemianopsia which proved to be of hysteric origin. (Garvey)

A diagnosis of left homonymous hemianopsia of hysteric origin was made on the finding of definite signs of hysteria and negative findings for organic disease. Shortly after being admitted to the hospital, she had two attacks definitely hysteric in type. She was treated by static electric treatments and suggestion.

Five days later she had no complaints. She said, "My eyes and nerves are a lot better." The neurologic examination at this time was the same as on previous examination, except there was no evidence of tubular vision or hemianopsia and the patient was discharged from the hospital.

In a letter, seven months following her discharge from the hospital, her family physician states she is well.

It seems reasonable to assume the etiology of the hemianopsia to have been hysteric. There was no evidence of a toxemia, and the blow on the head does not seem to have been sufficient to cause a fracture of the skull. The negative X-ray report, with no history or signs of other cranial nerve involvement, seems to rule out fracture of the skull. Multiple sclerosis might give such visual disturbance, but the mode of onset and paucity of other clinical signs of multiple sclerosis makes such a diagnosis improbable. Ophthalmic migraine might also be considered, but hemianopsia accompanying this condition is usually of short duration. The most conclusive evidence is the fact that the condition, then of many months' duration, cleared up following static electric treatments and suggestion.

I wish to thank Dr. C. D. Camp for permission to report this case and for his helpful suggestions and criticisms.

REFERENCES.

1. Wilbrand and Saenger. Neurologie des Auges, vol. iii, 2, p. 1043.
2. Wilfred Harris. Brain, 1897, p. 308.
3. Pierre Janet. La Presse Medicale, 1899, p. 243.

NOTES, CASES AND INSTRUMENTS

DIVERGENCE PARALYSIS.

L. Waller Deichler, M.D.

PHILADELPHIA, PA.

Read before the Section on Ophthalmology, College of Physicians of Philadelphia, March 16, 1922. See p. 733.

Divergence paralysis is not a common condition. It is one of a primary convergence excess and is characterized by a convergent strabismus and homonymous diplopia, greatest in degree for distance; and both diminishing as the point of fixation is approached toward the face, until at some comparatively near point the squint disappears with the attainment of single vision and orthophoria.

Cases of this kind have been reported as secondary to abducens paralysis, which this condition superficially resembles. But true paralysis of the sixth nerve never produces a strabismus and diplopia which diminish, or remain the same as the eyes are carried to the right or left. Nor are the excursions of both eyes of normal extent, both of which points distinguish divergence paralysis.

Berry believes these cases to be spasms of convergence. But here the eyes are thrown into a position of extreme convergence at every attempt of fixation of the object whether it be far or near, and especially in fixing upon a near object, particularly as it is brought closer and closer to the eyes.

This case then, which exhibits all the characteristics of true divergence paralysis, may be of interest. The history is as follows:

Miss A. C., 48 years of age, reported January 24, complaining of double vision. She had always enjoyed good health with no ocular complaints until last Thanksgiving day, when she noticed a sudden impairment of sight which has grown progressively worse, and for the past two months everything appears double.

Examination at this time gave: Vision of 20/30 in each eye, both with and without glasses.

External appearance, cornea and anterior chamber are normal in each eye. The pupils are equal and react promptly to light and accommodation. There is an alternating convergent strabismus, fixing either eye but with a slight preference shown for the left eye. The ocular movements of each eye are normal with no limitation in any direction.

At 20 ft., there is 24° of esophoria, the left eye fixing. With the test object held at a distance of 1 meter from the face, there is homonymous diplopia in all fields; and as the object is brought nearer, the images approach each other; until, at a distance of 5 in. from the face, the squint disappears with single vision. This is retained as the light is carried to the right or left of the vertical center for about 20° on either side, when one or the other eye remains fixed while its fellow turns in with reappearance of the diplopia.

While the light is directly in front and 1 meter away from the patient, both images are on the same level and parallel, but, when it is carried to the right or left, the images approach each other and are closest together in extreme abduction, remaining however on the same horizontal level and parallel thruout. With the object held at this same distance from the face, the images remain on the same level and are parallel in all parts of the vertical field.

This condition has remained about the same as when first seen, except that on February 14, single vision was obtained when the light was held 14 in. from the face.

Duane states that true divergence paralysis develops suddenly and is often caused by organic brain disease. In this case there is the suggestive sudden onset, and in addition, there has been a progressive loss of health and strength with the development of a peculiar ashen gray tint to the skin, suggesting organic disease but without localization. The laboratory examinations of blood and urine and the X-ray are all negative.

FIBROUS THICKENING OF UPPER LID FOLLOWING DIPHTHERITIC CONJUNCTIVITIS.

FRANK A. MORRISON, M.D., F.A.C.S.

INDIANAPOLIS, INDIANA.

Jan. 6, 1922, W. V., age 15, living in a neighboring town, was brought to the office by his father. According to the father, the boy had gone to school Jan. 2 as usual, but toward evening complained of something being in his left eye. Next day the eye was greatly swollen and discharging. He was taken to his family physician and treated without definite diagnosis and finally sent to me on Jan. 6.

At the time of the visit, the boy seemed very sick and was almost carried into the consultation room. The left lid was intensely swollen with a bloody serum streaming from it. A membrane protruded from between the lids. The preauricular glands were swollen, temperature 102° F., and the general physical depression marked. The ocular and palpebral conjunctiva were covered with a grayish adherent membrane. Cornea clear. A hurried examination of a scraping by a pathologist in the building confirmed the diagnosis of diphtheritic conjunctivitis.

Upon learning of the diagnosis the father elected to take the boy home and place him under the care of his family physician. Accordingly he was at once given 10,000 units of antitoxin, a solution of permanganat of potash for irrigation of the eye, and returned to his home. Nothing more was heard of the case until Feb. 1, when the boy again presented himself in company with his father and a letter from the physician requesting me to enucleate the eye. The father stated, after going home the membrane extended into the nose, and a culture sent to the laboratory confirmed the diagnosis of diphtheria. He had been given 30,000 units of antitoxin during the course of the illness.

The upper lid now completely covered the lower lid. It was hard and fibrous to the touch. No view of the cornea could be gotten until a canthotomy had been made. This was done under local injection of novocain and the lid partially everted. The cornea was hazy in the center and devoid of epithelium. The exposed conjunctival lid surface, pale and rough, had the feel of fibrocartilage. Under novocain injection, a large piece of the lid extending into the fornix was removed. There was little bleeding and it cut like dense fibrocartilage. The piece removed at this time was roughly three-quarters of an inch in length and a quarter of an inch in breadth. A borated ointment with atropia was prescribed and the boy went home.

At the next visit three days later the excised part had been almost replaced and a like section was again made. Without going into details, these sections were repeated at increasing intervals until eleven such had been made, and the amount of tissue removed was considerably larger than the thumb. The amount of tissue removed at each section was less than at the preceding as there appeared to be but a partial replacement of tissue after each section.

The ultimate outcome was good. A very faint scar marks the place of the corneal abrasion and a slight ptosis remains. The specimen submitted to the laboratory brought out the report that it was almost a pure fibroma, and one gentleman unacquainted with the history of the case volunteered the opinion it was "of very slow growth."

A COMBINED PERIMETER AND SCOTOMETER, SIMPLE AND EFFICIENT.

EDWARD J. BROWN, M.D.

MINNEAPOLIS.

When I read in the presessional volume of the recent International Ophthalmological Congress Col. Elliot's assertion that mapping of the visual field should be done circularly and not radially, and that those of us who had done the latter had done bad work, it occurred to me that I could make a very simple instrument for the

purpose. I have always believed that there was great advantage in the distant fixation employed by Schweigger in his hand perimeter, and followed by me in the small instrument presented to the American Academy of O. and O.-L. in 1917.

The base of my new instrument is a brass tube 24 inches (60 cm.) long

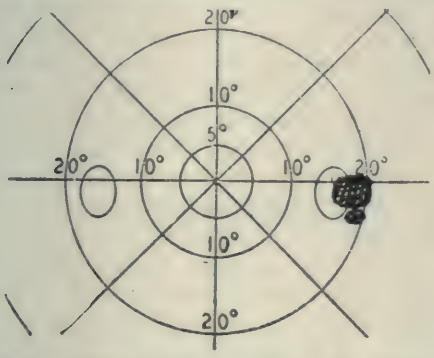

Fig. 1. Field of vision as taken on the Peter campimeter.

and 3/8 inch (1.4 cm.) in diameter. To the proximal end is attached a handle and at a distance of 5 cm. a strong brass wire ring 5 cm. diameter to apply around the eye to be tested. On a 2.5 cm. long brass tube of size to move easily over the longer tube, a 10 cm. square of light brass is mounted, to which is soldered a sufficiently long wire to serve as a carrier for the target. This wire is bent sufficiently to bring the end to the position of alignment with the front of the eyes, or 90 degrees. Opposite this target carrier is soldered an amount of brass to balance it.

Any length of radius desired may be used, the conventional 33 cm. or otherwise. I have adopted 22.6 cm. for the outer field radius, and 7.6 cm. for the paracentral field. It is perfectly obvious that when the sliding tube is so placed that the target is at the vertical

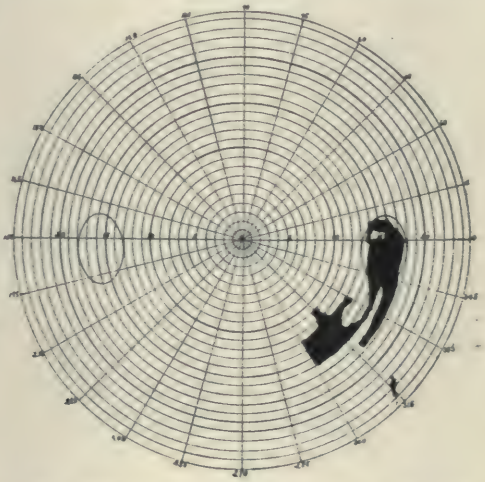

Fig. 3. Map of same field taken on combined perimeter and scotometer

plane of the eyes, the slide will register 90 on the long tube. When the slide moves forward the length of the radius, 22.6 cm., the registration will be for 45 degrees, and it is an easy trigonometric proposition to determine the place on the tube corresponding to each five or ten degrees of arc.

With the radius 22.6 cm., it is easy to map out the peripheric limits; and the scotomata which may be present in any part of the field down to 21

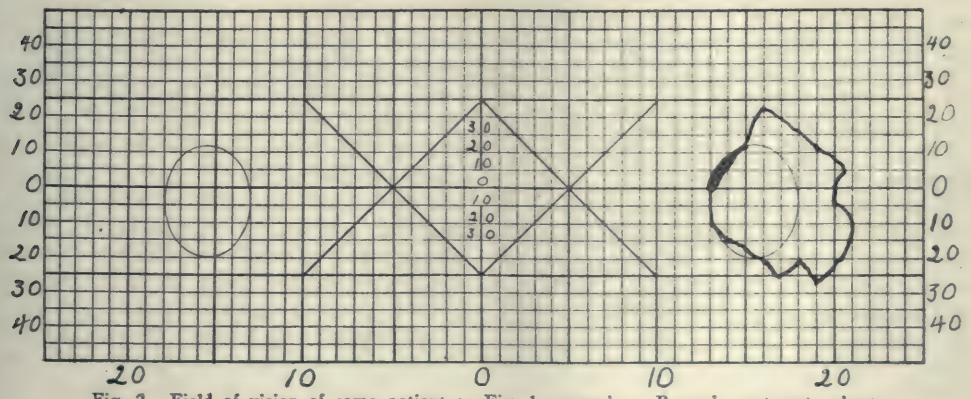

Fig. 2. Field of vision of same patient as Fig. 1 mapped on Brown's scotomata chart.

degrees. With the radius 7.6 cm., the paracentral region may be mapped including the blind spot of Mariotte and down to about 8 degrees. By making the long tube 1 meter the field can be mapped to five degrees.

A still simpler instrument, which I have made, has a strong steel rod 3/16 inch diameter instead of the tube, but it has the disadvantage that there is not sufficient room for marking the degrees, except by marks which have to be counted. When an eye has insufficient central vision to see thru the tube the sighting may be at the end of the tube or along the top of it, which will give only a negligible error.

My limited use of these instruments indicates that fields may be much more rapidly and completely mapped than with other instruments with which I am acquainted, and with decidedly more ease and comfort for both patient and surgeon.

The accompanying charts show the results of measurements of the blind spot of a patient of Dr. Charles Nelson Spratt by the Peter campimeter, the Brown scotoma map and this new instrument.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

May 15, 1922.

Dr. E. K. Findlay presided.

Prof. Ernst Fuchs of Vienna was the guest of honor.

Ectropion of Left Lower Lid.

Dr. Michael Goldenburg presented a man, aged 87, who came to the hospital on October 28, 1921, with an ectropion of the left lower lid, due to a complete paralysis of the left facial. In view of the age of the patient it was thought advisable, in order to save the eyeball, to stitch the lids together.

At the time of presentation the facial paralysis was much improved, and it was thought that the lids would be separated a little more toward the inner canthus to permit the patient to see a little better. Diagnosis by a neurologist was hemorrhage into the internal capsule.

Sarcoma of Eye.

Dr. Goldenburg then presented a woman, aged 34, a housewife, married 15 years, who had five children, all living, no miscarriages. She first noticed a protruding of the right eye last November. It had progressively become worse, but she stated that it was somewhat improved in the last few days. At onset she had severe headache, involving the area around the right eye. This pain was accompanied by weakness. Examination showed the right eye protruding forward and outward, and could not be replaced. Left eye negative. Vision, right eye 15/200. Vision, left eye 15/20 minus 2. Right and left pupil reacted to light and accommodation.

Fundus: Right media clear. Temporal side of disc could be defined. Nasal side tilted forward and lost in surrounding tissue. Some tortuosity of vessels, particularly on nasal side, as if there were some bulging on that side involving the whole eyeball. A vertical wrinkling of the retina was noticed. No hemorrhages visible. Left, media negative. Disc fairly well defined, shallow saucer cup. Vessels, retina and macula negative. Right antrum was irrigated with difficulty, but no discharge was found. Nasal examination disclosed septum slightly deviated to the left. Inferior turbinate normal. Middle turbinate pressed against septum. Upper part of nasal vault pretty well closed up. Slight discharge from right middle meatus. Blood Wassermann negative. Radiogram showed a complete blocking of the right antrum, right ethmoid and right frontal sinus. The rim of the

right orbit in the region of the frontal sinuses and the ethmoids showed a marked destruction. This condition was evident in the anteroposterior view and in the perpendicular view. The lateral view showed a marked apical abscess involving the superior right first and second molars. An attempt was made to irrigate the right antrum, but when the trocar was introduced no water could be forced in until the trocar was partially withdrawn, indicating that some part of the antrum was filled. The suspicion based on radiographic findings was that it was a sarcoma.

Coloboma of the Macula.

DR. A. P. HUNNEMAN presented a boy who came into the hospital because of poor vision. During the routine examination, the interesting condition was found and diagnosed as a coloboma of the macula. The term "coloboma of the macula," however, should only be used in a topographic sense, to indicate a partial atypic coloboma of the retina and choroid, since the macula is not developed in the fetal cleft. These colobomata are supposed not to be hereditary but may be congenital.

These cases were rare, and might be mistaken for choroidal changes. About 46 cases had been recorded up to 1916. Usually the horizontal oval diameter was 1 to 10 disc diameter. There was generally some ectasia, 1 to 6 D., maxium 10 D. The edges were usually sharp and showed a line of pigment. There was often a yellowish zone outside. The surfaces might show patches of pigment. Where coloboma was unpigmented it had a pearly glistening color. As in other colobomata, there were retinal and ciliary vessels. Large branches of the ciliary vessels might emerge from the floor. Coincident anomalies were rare.

The refractive error in this case was myopia. Vision of the right or affected eye was 18/200 and of the left 20/20 with correction. The size of the coloboma was about 4 and 3 disc diameters, with an ectasia of 6 D., and was slightly pigmented on the nasal side.

Uveitis, Bullous Keratitis, Hypertension.

DR. T. D. ALLEN presented a young lady, referred to him in November, 1921, with a history of pain in the right eye extending over a period of eleven months. Examination showed the right pupil widely dilated (atropin). Vision, hand movements, and at times fingers at a few feet. The cornea was steamy, particularly the lower half, and a large bulla could be seen on it. The anterior chamber was quite deep, and there were spots on the posterior surface of the cornea. There was slight edema of the conjunctiva. Tension was considerably increased to the fingers. The use of eserin reduced the tension to a marked degree. The fundus could not be clearly seen.

The following day the bulla on the cornea had completely disappeared; the tension was 60 mm. of mercury, whereas in the left eye it was 24 mm.; eserin was again used and the tension came down. A diagnosis of uveitis with bullous keratitis and hypertension was made. The patient was sent to the hospital where careful general examination revealed no gross abnormality. The sinuses were investigated, the ethmoids and sphenoids on one side completely cleaned out, and the tonsils cleanly removed without relief. Teeth negative, and tuberculin tests negative.

Finally, a paracentesis was done, with relief for about one week; when the tension again went up and remained high, in spite of miotics or mydriatics. After further study it was decided to give some foreign protein intravenously. This gave immediate relief. The first dose, which gave a chill and temperature of 102°, reduced the tension; the eye became white for the first time in months and all subjective symptoms were relieved. There was a relapse, so the dose was repeated, and in all seven injections of typhoid vaccine were given.

The patient then left the hospital and was watched at home for a time, but the condition recurred. Owing to the history of pus tubes after marriage some ten years before, she was put on g. c. vaccine, but as there was no sys-

temic effect after increasing the dose to 4,000,000,000 it was discontinued and another dose of typhoid vaccine was given. This caused a marked reaction, and since that time there had been no return of tension, the eye had remained white, there had been no subjective symptoms, the patient had felt better and gained weight. The bullae on the cornea, tho smaller, had continued to form about once a week.

Soon after performing the paracentesis, all of the epithelium was removed from the lower two-thirds of the cornea. The membrane of Bowman was scraped and iodin applied. Three days later a bulla appeared on that place. At presentation the vision was 20/50 in the right eye, and there was a small organized exudate in the posterior chamber at 6 o'clock, which was visible with the naked eye when the pupil was dilated. There were also still many deposits all over the posterior surface of the cornea. The left eye had been perfectly normal at all times.

Discussion. Professor Ernst Fuchs, of Vienna, believed that in this case, if the cornea was scraped and the vesicle examined, a fine new membrane would be found under the epithelium. The steaminess of the cornea, in an attack of glaucoma, acute or chronic, was due to the accumulation of droplets between the deeper layers of the epithelium, due to the high tension. If the tension dropped, the steaminess might disappear within 1/2 hour to an hour, as these droplets were absorbed. In cases of long standing, these droplets coalesced and formed large accumulations of liquid beneath a newformed thin connective tissue membrane, lying between the epithelium and Bowman's membrane. Bowman's membrane was perfectly smooth, and it was easy to understand that such a membrane superimposed on it was not firmly attached and could be easily detached by the accumulation of fluid. On attempting to remove the vesicles by scraping, a great part of the epithelium could be removed, sometimes almost the entire epithelium, which could not be done with a normal epithelium. Microscopic examination showed a fine membrane connected with the epithelium. He had removed the vesicles and touched the exposed corneal stroma with iodin and knew of nothing better. This had to be repeated in some cases.

Melanotic Epibulbar Tumor.

Dr. William H. Wilder presented a young unmarried woman with a melanotic growth on the temporal side of the left eye, which was visible even at a distance. This growth appeared about eight years ago, beginning near the temporal limbus. It gradually increased in size, became slightly elevated and encroached on the corneal limbus. She was seen two years ago, and the diagnosis of melanotic sarcoma was made, and the customary treatment of enucleation advised. The patient had never had any pain, the vision was normal, and there was no sign of disturbance inside the eye, so the patient refused to accept either the diagnosis or treatment.

Radium therapy was instituted and she had received thirty or forty applications of 100 mgs. radium for as much as fifteen minutes at a time. For a time this seemed helpful, and a peculiar change had taken place. Evidently from the effect of the radium, the pigmented cells had been dispersed and could be seen scattered over the conjunctiva. The growth had not decreased, but was extending and encroaching more and more onto the cornea. Dr. Von Der Heydt had examined the eye with the slit lamp, but could find no evidence of new pigmentation in the interior of the eye.

The case was interesting because of its chronicity. Melanotic sarcomata usually grew rapidly, but this growth had existed for years. Dr. Wilder wondered if they might be mistaken as to the exact nature of the growth, and whether it might be a *pigmented epithelioma.* These were rare, but did exist. This surmise had been strengthened by Dr. de Schweinitz, who saw the case and thought because of the chronicity it might be this type of growth.

The patient disliked to part with an eye that had normal vision, but he

believed a radical enucleation was indicated.

Discussion. Professor Fuchs thought this was a most extraordinary and interesting case from several points of view. First, as to its nature, whether it was sarcoma or carcinoma. Because of the pigmentation it looked like a sarcoma, while the flat, superficial growth on the cornea resembled a carcinoma. The principal question was whether it might be a pigmented carcinoma, but he is doubtful of the existence of a real melanotic carcinoma. They had often been described, but he had never seen one that he was satisfied should have that diagnosis. In the cystic carcinomas, it was found that they usually started from a nevus on the limbus, being therefore of mesodermic tissue. He did not believe these were actually epitheliomas, but that they were really sarcomas, because when they grew they developed into regular sarcomas, altho they looked like carcinomas in the beginning.

Another interesting feature of this case was the scattering of the pigment around the tumor. There was a well circumscribed tumor, but for a distance nearly one centimeter away, the conjunctiva was filled with scattered pigment. He thought these were particles carried away from the main tumor, perhaps thru the lymph current, and perhaps by phagocytes. Such cases had been described, and he had seen one, in which after a blow on the eye there was a subconjunctival rupture of the sclera. The iris had become detached all around and had been expressed thru the wound under the conjunctiva. In those cases the pigment of the iris became free by necrosis of the iris and was scattered all over the eyeball, so that the whole white of the eye had become dark. He believed the appearance in this case was due to the same dissemination of pigment by lymph or phagocytes, probably because of the radium therapy. It had become free because of necrosis of the tissue of the tumor.

As to the treatment, he thought the safest plan would be to remove the eye, together with all of the conjunctiva containing pigment. The prognosis was very different in sarcoma and epithelioma. If it was sarcoma there was great danger of metastasis. He knew of several cases in which after removal of a small sarcoma, or melanoma, of the limbus, the patient had succumbed within two years. As the patient did not want to part with the eye, the best thing would be to make an extirpation of the tumor, cauterize the surface with the galvanocautery and treat it afterward with radium and examine the excised tissue. If it proved to be sarcoma, the eyeball should be removed at once. If it was carcinoma it was not so dangerous, altho there might be local recurrence. He did not know whether there was a history of nevus in this case or not.

(Dr. Wilder said that the patient reported a small pigmented spot on the cornea having existed before.)

Dr. Fuchs said if that was the case the condition spoke in favor of a previous nevus, and it was now probably a melanotic sarcoma. This was much more likely as the patient was not of the carcinoma age.

Dr. Wilder thought that while the pigmented epithelioma were very uncommon, probably every one who had done much pathologic work had seen some cases. He recalled one case with a sort of cauliflower growth, that developed in the limbus of the eye of a negro. He did not advance the view that the present case was of that nature, but had thought from the beginning that it was a melanotic sarcoma, particularly because of the firm, pigmented growth usually described, but the chronicity of the case made him doubt this. The woman had a very dark complexion and the irides were distinctly dark, which might account for the appearance. He was inclined to think the best measure was enucleation, but the patient had not yet consented.

With all due respect to Professor Fuchs, he would hesitate to make a section for the purpose of diagnosis. He had refrained from this, because in America we had been educated up to the belief that the less one meddled with a suspicious growth for the pur-

pose of a histologic examination, the better for the patient.

Nodular Keratitis.

Dr. C. O. Schneider presented a case of a young woman, aged 36, with a rare and interesting corneal condition (nodular keratitis), which he had first seen three weeks before. She had been troubled with inflamed eyes as long as she could remember. Her mother told her this started following measles as a small child. One sister, now dead, had a similar trouble in the left eye. She thought the condition was progressing and vision was diminishing. Her vision at this time was R. 20/200 and L. 10/200. When she was first seen, there was also one small area on the cornea that was ulcerated and stained with fluorescein, but under treatment this cleared up and did not stain by the following week.

On the cornea of the left eye were six to eight elongated, irregular, white patches, each approximately two millimeters in length. The surface of these areas was quite rough, and they projected distinctly above the surface of the healthy cornea. The right eye also had a similar opaque area, ribbon shaped and extending over half way across the cornea. At presentation none of these areas stained.

A record of the same patient made ten years ago at the Infirmary had been found. The case was then diagnosed as keratitis eczematosa. The vision was R. 20/200; L. 8/200. The description of the lesions was much the same as the present findings, and the fact that the leucomas were elevated was also mentioned. There was then present redness, pain, photophobia and lacrimation, which, however, were not marked symptoms at the present time.

Discussion.—Dr. Harry Gradle said this case was very reminiscent of a case shown by him some time ago. Dr. Jackson, of Denver, also saw the case. He called it keratitis marginalis vesiculosa. That patient showed much the same condition as this one, but in both eyes. On the cornea, about 1 mm. from the limbus, were small vesicles, which were elevated about one-half millimeter. These vesicles were filled with perfectly clear fluid. Upon evacuating the vesicles, the corneal epithelium sank back and left an area which was very similar to those in this young woman's eyes. These were in a crescentric form over the entire limbus, so that the eye resembled the contour map of the foothills. The slit lamp threw no light on the case, and he had found no treatment of value, with the exception of possible thinning of the areas by dionin. In response to a question from Dr. Fuchs, Dr. Gradle stated that the lesion went deep, below Bowman's membrane, and the vesicle was composed only of epithelial cells.

Professor Fuchs thought this did not look like vesicle formation, but those who had seen the case, of course, knew more about it. He would have considered the case as related to the keratitis nodosa of Groenouw. In those cases, the elevations were not filled with fluid, but were solid. If one of the opacities would be removed for examination, he advised putting it first in glacial acetic acid and then staining it according to the Giemsa method. In this way the two substances contained between the corneal lamellæ were very well shown.

Progressive Opacity of Cornea.

Dr. Robert H. Buck presented a colored man, who stated that about eight months ago he noticed failing vision in his left eye. He had no pain, and the eye was only slightly reddened. A white spot appeared in the cornea, and this had been growing gradually larger while vision had been failing rapidly. Examination revealed vision of 20/200 in the right and no vision in the left eye. He had marked nystagmus, which had been present since childhood. The left cornea showed some opacity, and there was an amount of organized exudate in the anterior chamber, adherent to the lens. The iris was degenerated and the lens was opaque. Tension was very low. The condition was suggestive of intraocular tumor or a long continued iridocyclitis. Transillumination was unsuccessful.

Discussion.—Professor Fuchs said this was a very doubtful case, and he thought it was impossible to tell what

it might be. In regard to the transillumination, he had learned in this country that the eye of a really black negro could not be transilluminated.

In reply to a question Professor Fuchs said: That dystrophies were so extremely manifold and some of them so rare, that one man scarcely saw two cases alike, so that it was impossible to class them as a definite disease. It was hard to tell what was typical when one saw only single cases. Many of them were probably related to the keratitis of Groenouw, as the lattice keratitis and others, attacking often several members of the same family. There were other cases in which there was infiltration with fat or lime salts, and others in which the cause was unknown. In some cases it was said that the internal secretion was the cause, but there was no definite proof of this. Sometimes after a thyroidectomy opacity of the cornea followed. Similar cases had been observed in myxedema, but these cases were very rare and exceptional. It might be that in these cases some disturbance of internal secretions was the cause, but nothing definitely was known about this.

Dr. Robert Von Der Heydt asked Professor Fuchs if he had seen any of the corneal cases Haab had described as buchstaben-keratitis and considered as possibly tuberculous.

Professor Fuchs replied that he had seen a case, but it was not tuberculous. Some observers considered keratitis nodosa as tuberculous, but this was certainly wrong. He had examined some of the cases histologically and there was no trace of tuberculosis.

Robert Von Der Heydt,
Corresponding Secretary.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

March 16, 1922.

Dr. McCluney Radcliffe, Chairman.

Unusual Type of Cataract.

Dr. Warren S. Reese (by invitation) exhibited a male patient, aged 29 years, with bilateral cataract. The lens presents a 5 mm. circular opacity, occupying the pupillary area, and in the anterior cortex, thru which a fair fundus glare is obtainable. In the center of this opacity are numerous other, perfectly opaque, nodular opacities. These extend almost to the periphery of the large circular opacity.

Discussion. — Dr. William Zentmayer said the type of cataract shown by Dr. Reese is probably that pictured by Bach and also by Collins, and described by the former as a case of lamellar and central cataract. The arrangement of the denser opacities in the center of the nucleus resembled somewhat that of coralliform cataract, but they have a waxy rather than a crystalline appearance. It is probable that these opacities within the zonular region are due to accumulation of granular matter in the lines of separation between the different layers of the lens—the socalled "lens star."

Dr. Burton Chance said that he was greatly interested in Dr. Reese's case by reason of the fact that he discovered that the young man had been under his own observation a number of years ago. Indeed, he was one of five in a family presenting in each eye, the same form of cataract. These disciform cataracts are known in the literature as the "Coppock," from the name of a family among which Nettleship and Ogilvie found seven generations so affected. Chance's cases were reported at the meeting of the Ophthalmological Society in 1907. None of the family has been seen by Chance since then, but he immediately recognized the man's eyes. He would only add, that so far as he is able to recall to his memory the unusually accurate drawings by Miss Washington, the cataracts have not changed in size or density, nor the eyes in their refraction. It is of additional interest to learn that the young man was accepted for military service in 1918.

Localized Cataract With Unusual Fundus Changes.

Dr. Warren S. Reese (by invitation) exhibited a male, aged 28 years. Three years ago he was struck in the

left eye with a hand grenade fragment. He now presents no external evidence of injury. Thru the dilated pupil a localized opacity of the lens can be seen in the extreme nasal periphery. From this point a rather wide silvery band runs backward thru the vitreous and, as it reaches the posterior pole, expands into an area of choroiditis just up and in from the disc. In the lower nasal periphery there is a localized detachment of the retina. Notwithstanding the above changes, the patient's vision is improved to 15/20 with a —2.50 sph. ⊃ + 6.00 cyl. axis 90°. A small foreign body has been localized by the X-ray, 6 mm. back of the center of the cornea in the horizontal plane, and 8.5 mm. to the nasal side.

Advancement and Transplantation for Paralysis of Superior Rectus.

Dr. Burton Chance presented a case of paralysis of the left superior rectus together with partial ptosis, believed to have been caused by infantile paralysis, in a young girl now sixteen years of age. A resection advancement of the superior rectus was made and slips from the lateral muscles were united to the advanced mass. The simple sutures advocated by Posey were employed. These have held securely, and marked upward movement has been obtained, with no interference with the lateral rotations.

A New Protractor Card.

Dr. Sidney L. Olsho (by invitation) showed a new protractor card for verifying the axes of the clyindric and sphero-cylindric lenses. (See p. 451.)

A New Trial Frame.

Dr. Sidney L. Olsho (by invitation) showed the mechanically perfected model of his trial frame, and described the method by which refraction is coordinated with spectacle and eyeglass fitting. (See p. 718.)

Coloboma of Disc and Retina.

Dr. Burton Chance presented a case of triangular coloboma of the temporal half of the disc and of the adjacent uveal tissues, in each eye of a middle-aged colored woman.

Artificial Tendons.

Dr. Burton Chance exhibited a case of angioma of the orbit, reported three or four years ago, in which the elevators of the globe had been involved in the vascular mass, and the young woman had never been able to rotate the eye upwards. Moreover, there was absence of check muscles and capsular tissues. It was conceived that strips of skin from the forehead might be united to the globe to serve as "check ligaments," if not as artificial tendinous structures. Accordingly, narrow strips were dissected from the superciliary region, turned on their bases and drawn thru tunnels thru the orbicular into the retrotarsal fornix, and united to the scleral tissues. These bands have held well, for over a year, and, by being on the stretch they tend to raise the lid, and have distinctly elevated the anteroposterior axis of the globe, greatly improving the girl's appearance as well as adding to her comfort by reason of the backward pull which they exert.

Pneumococcic Ulcers.

Dr. William Zentmayer exhibited a man who had been admitted to the Wills Hospital about four weeks previously with an extensive pneumococcic ulcer. Under the use of Shahan's thermophore and the use of ethylhydrocuprein, the ulcer healed without perforation. At present the anterior chamber is of normal depth and there is a scar covering two-thirds of the central part of the cornea, grayish in color. The patient was exhibited as showing the result of what might be termed the modern treatment of pneumococcic ulcers, and also to call attention to a possible danger in the use of ethylhydrocuprein.

He also referred to a woman, 37 years of age, with dacryocystitis, who had had injected into the sac thru the canaliculus several drops of a 1% solution of ethylhydrocuprein, besides having had the sac washed with mercurophen after the use of holocain. One hour later she complained of excruciating pain and exhibited an exfoliation of the epithelium of the cornea, over a sur-

face of 5 mm. in diameter. Fortunately there was no longer any discharge from the sac, as this had ceased after the second treatment. At first the thought was that the epithelium had been abraded either by the probe or as the result of the combination of chemicals used at one sitting. However, as Dr. Ball, of St. Louis, in a personal communication stated that he has seen this occur more than once, after the use of ethylhydrocuprein, and Dr. Bedell, of Albany, has seen such a result following the use of the drug in rabbits, it is more than likely that the ethylhydrocuprein was responsible. The solution used had been prepared a week previously for the treatment of the same condition in another patient (also cured) and was therefore not entirely fresh.

Discussion.—Dr. Burton Chance said that as he had somewhat reluctantly adopted use of ethylhydrocuprein, he had always been cautious in administering it. He had not seen such effects as those specified by Dr. Zentmayer and Dr. Ball, follow its use; indeed, in a recent case of lacrimal sac disease, quite like that detailed by Dr. Zentmayer, he had used it with the greatest freedom he had yet exercised, without untoward results. He is inclined to believe that the unexpected action upon the cornea arose because of chemical reactions produced by the mixture of the many other solutions employed. He further believes that in the use of valuable drugs containing specific active principles, harmful or objectionable effects are produced by the chemical changes brought about by the simultaneous mixing of a multiplicity of collyria.

Angioid Streaks in the Retina.

Dr. William Zentmayer exhibited a case of this condition in a patient whom he had first exhibited in 1909 and again in October, 1914. There are undoubted changes in the appearance of the streaks. They are much less conspicuous, indeed, some portions of them are scarcely visible. The macular region in the right eye is occupied by an oval, completely atrophic area, with some pigment at its lower border. In the left eye there are hemorrhages below the macula.

Vision when first seen was: Right eye 6/9, left eye 6/6. To-day it is: Right eye 5/15, left eye 1/200.

When he came in 1909 he had a dendritic ulcer of the cornea, and he again exhibits the same condition.

Discussion.—Dr. Burton Chance said that the origin of the angioid streaks has continued somewhat a matter of speculation. To those who had the opportunity to examine many cases of military injury to the globe, the bizarre proliferation of retinochoroidal pigment frequently seen must have been commented upon. He had himself seen but few cases of angioid streaks before the war, but during his army service the thought of the resemblance of war cases to these unusual ones, had been in his mind, for had they not the same form of retinochoroidal traumatism, accompanied by pigment proliferation? And, might they not lead to similar formations as in the streaking depicted in Dr. Zentmayer's case? In each type there is the history of contusion or concussion, extravasation and development of connective tissue, and profuse wandering of pigmentary elements.

A Case of Divergence Paralysis.

Dr. L. W. Deichler (by invitation) reported a case of divergence paralysis. (See p. 723.)

Discussion.—Dr. Wm. Zentmayer said he was surprised at the statement made by Dr. Deichler that he had found but one other case in literature. Several cases have been reported by Duane and one case by himself at The College of Physicians several years ago, and recently he had given the notes of a case seen in consultation with Dr. Langdon where this condition was a complication of encephalitis lethargica. He had seen two other cases, one in a physician and one in the son of a physican.

Melanosarcoma of the Choroid with Metastasis at a Trephined Area.

Dr. George H. Cross reported the case of Mrs. H. D., aged 65, white, American, married. First seen October 20th, 1921, complaining of recurrent attacks of sharp pain in the right eye.

The father died of cancer of the nose, mouth, and throat at the Jefferson Hospital. A brother died at the age of 35, of cancer of the head at the Jefferson Hospital. Another brother operated ten years ago at Johns Hopkins Hospital had the abdomen opened and sewed up, nothing being removed. He is still living but unable to do heavy work.

History of present illness. July, 1920, after several attacks of pain in O. D., consulted an oculist. Under treatment the pain subsided but recurred at intervals. In February, 1921, a corneoscleral trephining was done, with no relief from the periodic attacks of pain. There was no vision in the painful eye, the tension was soft, the pupillary space was filled with a yellowish exudate over the lens, and a slight elevation at the trephined area. She was advised to have the eye enucleated, which was performed October 28th. Upon removal of the globe there was observed a spherical mass about 8 mm. in diameter around the nerve at its exit from the globe. The specimen was referred to Dr. Case at the Laboratory of the Graduate School of the University. Upon gross examination, there was found a grayish tumor, thru which numerous dark streaks were observed, evidently a choroidal growth, on cut section measuring 3 1/2x9 mm. with a posterior extension outside the globe and a metastatic growth at the site of the trephine scar. The lens is drawn toward the site of the trephine scar.

As the tumor is of interest only on account of its metastasis to the trephine scar, no attempt will be made to give a complete description of it. The microscopic examination of the specimen reveals it to be a melanosarcoma of the choroid extending forward along the choroid and backward along the optic nerve. The metastatic growth appears as a separate distinct mass at the site of the trephine scar, not connected with the forward extension of the tumor.

Discussion.—Dr. S. Lewis Ziegler stated that Dr. Cross' case of sarcoma had many interesting features but metatasis had occurred so early that radium applied in the socket would not have influenced the result.

He further wished to state that the interesting case of supraorbital sarcoma which he had exhibited in January as cured for more than two years, had recently been attacked with grippe which was followed by hemiplegia, convulsions and death. He had not learned further details except that there was no sign of recurrence, and vision in O. S. had improved to 10/200.

Dr. Wm. Zentmayer said that of course it is not always possible to diagnosticate intraocular growth in the presence of acute glaucoma. If the operation is done with the supposition that the glaucoma is primary, the danger of local metastasis is increased by the operation. He recalled one case in which he found that orbital metastasis had resulted from a sclerotomy done under the supposition that the detached retina was a serous one, but which proved to be secondary to sarcoma.

Specimen From Coralliform Cataract.

Dr. Wm. Zentmayer exhibited a specimen showing crystals from a case of coralliform cataract, the clinical and operative history of which was reported previously.

The specimen had been prepared by Dr. Verhoeff, who states that the fact that the crystals have the same morphology, stain the same way in eosin and carbol-fuchsin, and give the same identical reaction for protein with Millon's reagent, proves them to be identical with those which he described in a case reported two years before the American Ophthalmological Society, and which he determined to be of protein nature.

Charles R. Heed, M.D.,
Clerk.

OMAHA AND COUNCIL BLUFFS OPHTHALMOLOGICAL AND OTO-LARYNGOLOGICAL SOCIETY.

February Meeting, 1922.

Binocular Injuries by Glass.

Dr. J. M. Banister reported serious wounding of both eyeballs by glass

fragments from a shattered wind shield in an automobile accident, with late effects of local infection.

He saw this patient at the Hospital about ten hours after the accident, and found that both eyes had been deeply wounded by glass fragments from the wind shield. In the right eye the globe had been cut thru the cornea and iris, and the lens wounded and twisted on its axis, the inner margin forwards. Hemorrhage had occurred in the anterior chamber. The cut extended from about 2 mm. above the corneal limbus straight downward to a point 2 mm. below the lower margin of the cornea. The wound was blocked behind by the coming forward of the iris and lens. The left eye had a cut about five-eights of an inch in length above the cornea, extending thru the ciliary region and opening the globe extensively, so that vitreous humor was escaping. Under local anesthesia, conjunctival flaps were brought down to cover this wound. This eye has collapsed to quite a degree and is lost.

The right eye contains some degree of vision. Of late an iritis developed suddenly, with marked injection of the globe. X-ray examination showed two infected teeth. Dr. Depecher removed the teeth and diseased bone surrounding them, about twelve days ago, and the eye began to improve at once. By examination of the patient, the result can be seen, as well as an idea secured of the severity of the original injury. The eye which was totally blind has never been inflamed or tender. It should be stated that some weeks before the secondary iritis developed in the right eye, he removed his tonsils, which were infected, as a preparation for a needling operation of the membrane of the lens, considering it important to remove such foci of infection in advance. This case illustrates the importance of eliminating foci of infection before doing surgery of the eye. It is unusual on account of the injury to both eyes.

Discussion. — Dr. Dean. In such cases, the lens capsule is easily torn and drags on the ciliary body. The iris becomes adherent to the capsule, which brings in the element of danger in case of a needling operation. Atropin should be used before needling.

Dr. Lemere. In this case, there was a question as to whether sympathetic ophthalmia was present or iritis, and the possibility of removing the other eye was considered. It was decided that the condition was iritis due to foci of infection. Even in cases of sympathetic ophthalmia it is important to inquire into foci of infecton.

Dr. Potts asked why evisceration was not performed on the poor eye, which would have avoided the danger of sympathetic ophthalmia.

Dr. Banister. Evisceration was refused by the patient's friends as there was still light perception in the eye, altho the danger of keeping the eye was explained. There has never been any inflammation or irritation in the left eye.

Mooren's Ulcer.

Dr. J. M. Patton reported the case of Mr. E. J. H., who consulted him April 27, 1920, with a history of having gotten a cinder in his *left eye* the previous night. Vision, right eye 20/40 —1, left eye 20/200. There was a smooth looking ulcer just inside of left limbus. There was little irritation. May 3, 1920, very slight increase in the size of the ulcer, involving about 1/2 the thickness of the cornea. Conjunctiva at the margin was slightly thickened and a little more red.

May 18, 1920, the left eye was about the same, but the *right eye* began to trouble him a few days before. Now some ulceration, without infiltration, extended from 7:30 to 4:30 on the right cornea. Some undermining of conjunctiva. Left eye seems slightly improved in symptoms but ulcer about the same in size. Conjunctiva cut back from limbus about 1/8 of an inch, and area thoroly cauterized with trichloracetic acid. Examination of nose and throat practically negative. X-ray shows one pathologic retained dental root. 6-10-20 ulcers at outer side of cornea apparently healed. Left eye shows ulcer 1/32 inch in diameter at inner margin of cornea. Eye quieted down under treatment.

9-9-20 there was no staining anywhere. 10-27-20 right and left both stain slightly. 12-28-20 right eye seemed quiet. Left slightly progressive. 2-10-21 right eye very slightly active. Left eye cornea all gone except slight hazy center. Left eye progressed steadily until the center was destroyed. All the cornea was involved. Very slight progress in right. Right eye about same as at present for last two months. There may be very slight activity at upper inner portion of right limbus.

Previous cases of Mooren's ulcer in our experience were cured by deep cauterization with nitric acid. In this case, the following measures were employed. The actual cautery, excision of the conjunctiva around the ulcer, thermophore, iodin, delimiting keratotomy were used in the right eye without avail until the vision was very much reduced. In the left eye, the advance seemed to be stopped under present treatment of applications of weak silver nitrat to the lids, and diluted tricholoracetic acid to the active portions of the ulcer. Radium was tried but not the X-ray.

Rupture of the Choroid.

Dr. L. G. Howard stated: C. C. C. came in July, 1921, complaining of loss of vision in right eye. The vision in the right eye had been somewhat impaired, following a traumatism from a sling shot at the age of fourteen years, but was still serviceable, up until two weeks ago. Two weeks ago, patient was struck in right eye by some unknown object which, however, did not bruise, cut or contuse the lid or eyeball externally. He then experienced sudden and almost complete loss of vision in that eye. He could still see objects but very indistinctly. Condition has not improved since then. Has occasional mild pain in eye but not severe. Sees better at night. Strong light dazzles the right eye. Family and past medical history negative. Admits ordinary diseases of childhood. Denies venereal disease. July, 1921. Pupil 6 mm. Does not react. Cornea clear. Lenticular opacity. Fundus not seen distinctly because of vitreous haziness. O. D. V. cannot count fingers. No central vision.

December, 1921. O. D. V. counts fingers at three meters. O. S. V. 20/20. Pupil fixed, 6 mm. Tension normal. Opacity in lens. Vitreous clear. Choroidal tear thru macula.

Discussion.—Dr. Dean saw the case when it first came in. It was never decided just what caused the injury in this case. He thinks it was possibly a bird flying against the eye. The sudden onset of blindness was probably due to haze in the vitreous. There was no evidence of intraocular hemorrhage.

Dr. S. R. Gifford,
Secretary.

ST. LOUIS OPHTHALMIC SOCIETY.

March 24th, 1922.

Dr. F. E. Woodruff, Presiding.

Eyes of Military Recruits.

Dr. J. A. Flury read a paper on the Eye Findings in 45,000 Men Entering Military Service at Camp Lee, which is not available for publication.

Neuropathic Keratitis with Special Relationship to Sinuses.

Dr. J. W. Charles dwelt upon the theory that dendritic keratitis is a terminal nerve lesion and reported a case which seemed to be caused by ethmoidal disease. This is published in full. See p. 703.

Discussion.—Dr. W. A. Shoemaker said: The case to which Dr. Charles has referred is that of a man aged about 40, who consulted me Jan., 1921, with the following history: For the last three days both eyes had been inflamed. He has a good deal of secretion in the mornings and more or less during the day. Examination revealed a severe staphylococcus conjunctivitis. For use at home I gave him a solution of zinc sulphat.

Jan. 30th the left eye began to water, pain and feel rough. Examination revealed a small spot of superficial keratitis, which stained with fluorescein. Feb. 1st, there was an extension downward of the process; the cornea

was anesthetic, and I realized that I had a neuropathic keratitis to deal with, and proceeded to look for the cause. Teeth and tonsils were found to be normal. Blood tests negative, with the exception of hemoglobin, which was 65. Metabolism 99.1.

Patient had had, for years, a tuberculous left kidney, with a sinus that discharged more or less; but otherwise seemed in good health. The corneal inflammation was not looked upon as tubercular.

The rhinologist reported a bilateral suppurative ethmo-sphenoiditis, for which he had been giving him conservative treatment for some months. As the eye was not improving under treatment, I advised a radical operation on both ethmoids and sphenoids. Two days after the operation the eyes began to improve, and by Feb. 15th, were practically well.

Adler's Pencil for Detection of Color Blindness.

Dr. J. W. Charles showed how a patient was discovered in such inconsistent answers, in matching ninety-eight shades of colors in the Adler test, that either malingering or hysteria was certain; also the easily recorded and demonstrable results of the test.

Case of Hypothyroidism.

Dr. J. W. Charles reported the case of a woman, 53 years old, who consulted him in 1918, with a vitreous hemorrhage in one eye and papill-edema with a marked strapping of vessels in the other. She was about five feet tall, and weighed 270 pounds. Her blood pressure was 260/140; there was great dyspnea on slight exertion; the heart was greatly enlarged with myocarditis; the pulse was 90; the urine contained 1/10% albumin and many hyalin and granular casts. She was put to bed and given thyroid. Upon her second visit in the fall of 1921, the patient weighed only 170 pounds, her heart and kidneys seemed normal. She is now doing all of her house work and taking care of a husband with heart disease. The appearance of the fundus of her good eye is very much better in every respect, the vision being 23/19.

The sequence in this case was undoubtedly hypothyroidism, obesity, strain on heart and bloodvessels, high blood pressure with its consequences (eye signs, and temporary damage to the kidneys), with complete relief by means of rest and thyroid feeding.

J. W. Charles,
Editor.

WASHINGTON INTERNATIONAL CONGRESS.

(*Continued from p.* 674)

Wednesday, April 27th, 1922.

Endophthalmitis Phacoanaphylactica.

Dr. F. H. Verhoeff, and Dr. A. N. Lemoine, Boston, Mass. Uhlenhuth in 1903 showed that rabbits could be immunized by repeated intravenous injections of ox lens protein, so that the blood would give the precipitin reaction with lens protein from other animals, but that these immunized animals failed to give the reaction with ox serum. In other words, reaction was tissue specific and not species specific. In 1909 Uhlenhuth and Haendel showed that guinea pigs could even be sensitized to their own lens protein. These results have since been verified by other observers.

It is well known that after injuries to the lens, in some cases inflammatory reaction follows, while in others no such reaction takes place. Some have maintained this inflammatory reaction was always due to infection, others have regarded it as the result of irritation due to lens matter. The latter view was apparently first brought forward by Lagrange and Lacoste, in 1911, who reported eight cases in a series of one hundred cataract extractions. Schirmer had observed cases presenting the same clinical picture, in which he had found the aqueous sterile, but which he did not explain on the basis of irritation from lens matter.

More recently the view that lens matter may cause intraocular inflam-

mation has been elaborated by Straub, who has reported the clinical and microscopic findings in a number of cases of such inflammation which he has termed "Endophthalmia Phakogenetica." He did not consider the possibility that some individuals are more sensitive to lens protein than others, but regarded the inflammation as due to the special toxicity on the part of the lens, and maintained that toxicity increased with age. He did, however, attempt to immunize one patient with such an inflammatory condition by subcutaneous injections of lens protein.

It occurred to one of us that inflammatory reaction following injury to the lens in certain individuals might depend upon hypersensitiveness to lens protein, acquired or congenital in these individuals, and its absence to the lack of such hypersensitiveness. We have endeavored to test this hypothesis by clinical and pathologic observations and by animal experimentation.

To ascertain whether or not individuals are hypersensitive to lens protein, we have employed the dermal and intradermal tests commonly used for determining sensitiveness to foreign proteins. In all cases pig lenses were used for the tests, and in some of them in addition human lenses obtained at cataract operations, and ox lenses. The lenses were obtained under aseptic precautions and, after removing their capsules, dried in the air for twenty-four to forty-eight hours, and ground to a powder in a mortar with a pestle.

The dermal tests were made by scarifying the skin of the forearm with a v. Pirquet scarifier until serum exuded without blood, and then placing the lens powder on the scarified area and keeping it moist with normal salt solution for about twenty minutes. Controls were made with salt solution only. Positive reactions became observable usually in 15 to 60 minutes, and consisted in slight hyperemia and elevation of the area. One patient had a very irritable skin, so that the control area also showed considerable reaction, but the area treated with lens protein showed so much greater reaction that there was no doubt that the test was positive.

In the intradermal test we used a 10% solution by weight, of fresh lens in normal salt solution, to which 0.5% phenol was added, 0.04 cc. being injected between the layers of the skin. For the control, normal saline solution containing 0.5% phenol was used. A positive reaction consisted in elevation of the area and hyperemia around it. This was usually not definite in less than two hours, and sometimes not until about twenty-four hours. This test proved to be the more satisfactory of the two, since it was always positive when the dermal test was positive, and definitely positive when the latter was slightly so. In some of our more recent cases, we have used three different dilutions in making the intradermal tests.

By means of these tests we have attempted, first, to ascertain whether patients who have had intraocular inflammation apparently due to rupture of the lens capsule are actually sensitive to lens protein. Naturally, only twelve such patients were available to us for this purpose, but fortunately these few were exceptionally suitable. Following are the cases of this series, twelve in number, in which these tests were made:

Case 1. Contusion of the right eye with rupture of the lens capsule followed by iridocyclitis. Enucleation and microscopic examination of right eye. Later, iritis and glaucoma in cataractous left eye. Iridectomy. Cataract extraction. Rupture of the lens capsule found at operation. Dermal and intradermal tests with lens protein positive. Sections stained by Gram's method show no bacteria within the globe.

Case 2. Spontaneous (?) rupture of lens capsule. Marked iridocyclitis. Enucleation. Microscopic examination of eye. Dermal and intradermal tests with lens protein, positive.

Case 3. Spontaneous rupture of capsule of cataractous lens. Marked iritis with Descemetitis and hypopyon. Enucleation. Microscopic examination of

eye. Dermal and intradermal tests with lens protein, positive.

CASE 4. Perforating wound of cornea, iris, and lens. Removal of foreign body by magnet. Iridocyclitis. Enucleation. Microscopic examination of eye. Intradermal test with lens protein, positive.

CASE 5. Extraction of mature senile cataract, followed by iritis and glaucoma. Enucleation. Microscopic examination of eye. Intradermal tests with lens protein, positive.

CASE 6. Combined extraction of immature cataract, with early discission followed by severe iritis and attacks of increased tension. Dermal tests with lens protein positive.

CASE 7. Combined cataract extraction with considerable retention of cortical matter, followed by severe iritis, descemetitis, and infiltration of the cornea. Dermal and intradermal tests with lens protein, positive.

CASE 8. Extraction mature senile cataract by capsulotomy method with retention of cortical matter within capsule. Moderate iritis. Dermal tests with lens protein, positive.

CASE 9. Old injury of left eye with iritis probably due to lens matter. Ten years later, cataract extraction by capsulotomy method right eye, followed by iritis. Later, discission, right eye, followed by iritis. Intradermal test with lens protein, positive.

CASE 10. Senile immature cataract. Intracapsular extraction with rupture of capsule and retention of some lens matter in anterior chamber, followed by iritis. Intradermal test with lens protein, positive.

CASE 11. Immature cataract. Attempted intracapsular extraction. Rupture of capsule and retention of cortical matter. Chronic iridocyclitis and complete occlusion of pupil. Intradermal test with lens protein, positive.

CASE 12. Perforating wound cornea. Traumatic cataract partly removed by linear extraction. Iridocyclitis. Lens matter removed by irrigation. Rapid recovery. Intradermal tests with lens protein, positive.

Attempting to ascertain the percentage of individuals in general who are hypersensitive to lens protein, we have made dermal or intradermal tests in 50 cases of various eye conditions. These cases were unselected so far as concerned the existence or nonexistence of inflammatory reaction dependent upon injury to the lens.

The ages were: under 20 years, 9 cases; 20 to 40 years, 9 cases; 40 to 60 years, 8 cases; over 60 years, 24 cases. There were 26 males and 24 females.

The tests were definitely positive in only four of the fifty cases: one was a case of interstitial keratitis in a female aged 13 years; one a case of mature senile cataract in a female aged 64; and two were cases of immature cataract operated upon by the intracapsular method, in which the ages were 46 and 64 years. Intraocular inflammation occurred in the two cataract cases, cases 8 and 10 described above, in which lens matter was left in the eye at operation, and not in the other cataract case in which the lens was removed with its capsule intact.

The important question whether patients who fail to show intraocular reaction following injury to the lens are insensitive to lens protein is answered in the affirmative by the foregoing series of cases, since in the 30 cases of perforation or rupture of the lens capsule inflammatory reaction occurred only in the two cases in which there was a positive skin reaction to lens protein.

To determine whether or not the histologic changes following rupture of the lens capsule in sensitized individuals are such as to indicate that they are due solely to lens matter, we have studied these changes in the five positive cases described above, in which pathologic examinations were made, and compared them with the changes found in sections of all eyes in the pathologic collection of this laboratory which showed injury to the lens. We find that the injured lens in individuals hypersensitive to lens protein, attracts chiefly two types of cells, namely, pus cells and endothelial phagocytes. The pus cells infiltrated the lens substance, and when lens matter is present in the anterior chamber, collect here also. These cells after a time undergo necrosis, especially when pres-

ent in abundance. Eosinophiles generally are inconspicuous but are sometimes abundant. The endothelial phagocytes likewise invade the lens substance and may be seen in the act of phagocyting it. Sometimes they form thick syncytical masses bordering upon the lens substance, and often form giant cells of the Langhan's type. Endothelial phagocytes are also sometimes abundant in the anterior chamber, and here are often loaded with pus cells and chromatin fragments.

The iris is infiltrated with lymphocytes and plasma cells, the latter greatly predominating, while attached to its surface there are large and small lymphocytes and pus cells. Similar cells also are collected upon the posterior surface of the cornea, where they tend to occur in clumps. The collection of cells on the back of the cornea may be so massive, that it causes proliferation of the endothelium and extensive formation of fibrous tissue here (Case 3). Where the process is especially active, there may be a moderate amount of fibrin and blood in the anterior chamber (Case 3).

From the pupillary margin of the iris, fibroblasts and blood capillaries extend over and invade the injured lens and close it off, so that ultimately further egress of lens material to the anterior chamber is cut off by fibrous membrane. There is more or less proliferation also of the capsular epithelium, which after a time leads to the formation of anterior capsular cataract. The capsular epithelium in addition seems to give rise to a few free ameboid cells, which phagocyte the lens material, but these cells are so similar to the endothelial phagocytes that it is difficult to distinguish them from the latter.

In the case in which adhesion of the iris to the lens prevented lens material from reaching the vitreous chamber, the posterior part of the eye shows little reaction. When there is access of lens matter to the vitreous, the ciliary body shows more or less reaction. The interstitial infiltration, however, is relatively slight, and the infiltrating cells consist almost exclusively of plasma cells. From the epithelial surface there is an exudation of plasma cells and lymphocytes. The ciliary epithelium shows proliferative changes and may give off many free epithelial cells into the vitreous; in cases 2 and 4 dense cyclitic membranes have been formed. The choroid shows no involvement except anteriorly, where the infiltration of the ciliary body may continue into it for a short distance. The retina shows perivascular infiltration with lymphocytes, and more or less edema around the disc and in the macular region. In Case 4 there are nodular collections of lymphocytes, plasma cells, and large mononuclear cells on the inner surface of the retina and, in places, localized foci of neuroglia proliferation beneath the surface. The optic disc shows perivascular infiltration with lymphoid cells, slight edema, and in cases 1, 2, and 4, neuroglia proliferation along its surface.

In the pathologic collection of the Infirmary, covering a period of twenty-one years, we are able to find sections from 25 cases of injury to the lens in addition to those already described, which show changes which we regard as characteristic of phacoanaphylactic endophthalmitis. We also find sections from ten cases in which we are unable to determine whether or not the inflammatory reaction was due to anaphylaxis. In each of these cases the lens was infiltrated solely with endothelial phagocytes, and in one there was a tubercle on the anterior surface of the iris, due to lens matter which had been surrounded by endothelial leucocytes and giant cells. Whether or not in these cases the inflammation was anaphylactic in nature it is difficult to say, but the clinical fact that injury to the lens is often followed by no inflammatory reaction, suggests, that in some of these cases the reaction may have been the result of low grade sensitiveness to lens protein. As a matter of fact, three of the patients returned later and each gave a doubtful intradermal reaction with lens protein. Moreover, in the same pathologic collection we are able to find sections from five cases in which injury to the lens had caused no reaction. That so

few specimens of this kind can be found is obviously explained by the fact that only under exceptional circumstances are such eyes removed.

ANIMAL EXPERIMENTS.

In these experiments our purpose was to ascertain the effects produced by discission of the lens capsule in normal animals and in animals sensitized to lens protein. Guinea pigs and rabbits were employed. Ether narcosis was employed in all experiments except three in which cocain was instilled before operation. All enucleated eyes were fixed in Zenker's fluid and embedded in celloidin. Sections were stained in hematoxylin and eosin, and by Verhoeff's modified Gram stain for bacteria. No bacteria were found except in the right eye of Exper. 1, which was infected with streptococci. In connection with the Gram stain it may be well to state here that the cataractous lens, after fixation, often in places appears to have undergone transformation into fine granules, some of which are basophilic and stain deeply by the Gram method. Such granules sometimes occur in pus cells, possibly due to precipitation of lens material within the latter, and often closely resemble large cocci.

In our preliminary experiments 3/8 gm. of pig lens was injected subcutaneously into each of four guinea pigs. All of them died within three weeks, showing that too large a dose had been used. We then reduced the dose to 1/24 gm. per 100 gm. of body weight and had no further lethal effects. Intradermal skin tests were made at the end of four weeks to ascertain whether or not the animals were hypersensitive, and all of the injected animals gave positive tests. One of the control guinea pigs tested in the same way gave a negative reaction. Seventeen days later a discission was performed upon his right lens. This gave rise to so much reaction that we suspected that he had been sensitized by the subcutaneous test previously made. On making another intradermal test we found that this was actually the case, so that we desisted from making these tests in our control experiments.

Discissions of the lenses were made in the eight eyes of four rabbits. In two of the animals the discissions were made 21 days after subcutaneous injection of 1/24 gm. of fresh pig lens protein per 100 gm. of body weight. The eye of one control animal was infected and is therefore excluded from consideration. Clinically, the intraocular reactions were definitely greater in the treated animals than in the controls, but in the latter were greater than in control guinea pigs. Histologically, the reactions were also more marked in the injected animals, than in the controls, but did not show the characteristic features seen in hypersensitive guinea pigs and human individuals. Possibly sensitization by repeated small doses of lens protein might give more characteristic results.

The foregoing clinical observations, tests, and microscopic examinations, prove conclusively that certain individuals are hypersensitive to lens protein, and that when in such individuals rupture of the lens capsule takes place thru injury or operation or spontaneously, a characteristic inflammatory reaction results. This reaction may properly be termed endophthalmitis phacoanaphylactica.* Whether or not hypersensitiveness to lens protein is congenital or acquired, and if the latter, how it is acquired, we have at present insufficient data to determine. While experimentally it is possible to sensitize an animal to its own lens protein, the evidence is against the possibility that injury to the lens of one eye may sensitize an individual so that a local anaphylactic reaction will take place if the other lens is injured. The clinical fact, that in cases of congenital cataract discission of the cataract in the second eye ordinarily causes no greater reaction than that following discission of the cataract in the first eye, seems to be sufficiently conclusive on this point. Possibly, in these cases, absorption of lens matter slowly and continuously over a long period of time, if it has any effect, may cause

*Endophthalmitis phacoallergica may be a better term, but probably it would not be generally understood.

immunity rather than hypersensitiveness.

Our experiments upon animals seem to show that a guinea pig may be sensitized to lens protein so that a free discission of its lens capsule will be followed by a severe and characteristic intraocular reaction. That the dosage of lens protein employed was sufficient to sensitize the animals is shown by the skin tests and also by Exp. 12, in which a second subcutaneous injection, made 20 days after the first, caused marked general symptoms of anaphylaxis. Histologically, the ocular reaction differs from that in human individuals only in the extent to which the cornea is affected, the latter in the case of the guinea pigs showing marked haziness and vascularization. In Experiments 2 and 5, the cornea became almost completely vascularized. It is to be noted, however, that in one of our clinical cases, Case 1, the cornea became almost completely vascularized. In our control experiments, the intraocular reaction following discission of the lens was not only slight, but differed in character from that seen in a sensitized animal.

As Longcope has recently pointed out in human individuals, the state of hypersensitiveness to foreign proteins shows certain differences from that produced experimentally in animals, and he raises the question whether it is based upon the same mechanism. In this connection, he calls attention to the familiar occurrence of hypersensitiveness to certain proteins in human individuals, which suggests that inheritance is an important factor, and to the rarity with which specific antibodies are found in the serum of these individuals. Whether or not there is an important difference between the mechanisms of natural and artificially produced anaphylaxis, the clinical effects seem to be essentially the same, and our experiments on guinea pigs seem to show, that in animals sensitized to lens protein, the intraocular reaction produced by injury to the lens is microscopically identical with that in human individuals. It has been frequently noted that immune and anaphylactic reactions of rabbits are markedly different from those of guinea pigs, and Zinsser has recently pointed out the close similarity of such reactions in guinea pigs and human individuals. The former fact no doubt explains our failure to produce typical phacoanaphylactic endophthalmitis in rabbits, and the latter fact is confirmed and amplified by the positive results of our experiments on guinea pigs.

The clinical picture of phacoanaphylactic endophthalmitis is fairly characteristic, especially in marked cases. In the beginning there is simple iritis with posterior synechia. From the pupillary margin a vascularized membrane extends over the injured lens. At the same time the lens matter becomes infiltrated, until it presents an opaque finely granular appearance. At this stage, precipitates may be found on the posterior surface of the cornea. These are apt to be unusually large, and white in appearance. Sometimes, a small hypopyon is formed. If the process continues, the cornea becomes cloudy, and progressively vascularized. The intraocular tension is apt to be increased. Pain and congestion of the eye vary with the activity of the process, and are sometimes relatively slight. To make the diagnosis certain, dermal and intradermal tests with lens protein should, of course, be employed in all cases.

Our observations concerning the histology of phacoanaphylactic endophthalmitis are sufficiently summarized above, but we may point out here that the invasion of the lens substance by pus cells seems to be especially characteristic, particularly as regards the relatively normal portion. In other words, in hypersensitive individuals, exposed lens matter is pyogenic. We should, in fact, hesitate to make a diagnosis of phacoanaphylactic inflammation histologically in the absence of any purulent infiltration of the lens.

The severity of the intraocular reaction depends largely on the extent of the gap in the lens capsule, and upon the amount of lens substance that is extruded into the anterior chamber or vitreous. When the gap in the capsule

is so situated that access of lens matter to the vitreous is early cut off by adhesion of the iris to the lens, the reaction is confined chiefly to the anterior part of the eye, notably the iris. When the lens matter accumulates in the vitreous chamber, cyclitis results, and may lead to the formation of dense cyclitic membranes. In this event, also, the retina and optic disc may be markedly affected. When the defect in the lens capsule is covered over by organized tissue derived from the iris, egress of lens material is prevented and the inflammatory reaction then takes on a chronic and probably intermittent character, and may persist for a year or more.

The microscopic examination in Case 2 shows that there had been an old rupture (traumatic?) of the lens capsule, and old severe iridocyclitis. As a result of the latter, the lens had been walled off and invaded by dense connective tissue. The lens cortex had become completely cataractous and in many places calcified, but the nucleus had caused a marked inflammatory reaction, as shown by the fact that it was surrounded by endothelial phagocytes and giant cells, and deeply invaded by an abundance of pus cells. Whether or not the original iridocyclitis represented a reaction to lens matter it is, of course, impossible to say, but there can be no doubt that the recent reaction was of this nature. This case seems to show that reaction to lens matter may recur at long intervals.

From the foregoing observations, it will be seen that phacoanaphylactic endophthalmitis both clinically and histologically produces a picture similar to, if not identical with, that of the socalled serous traumatic iridocyclitis. We are, however, not yet prepared to say that the latter condition is always phacoanaphylactic in origin.

After cataract extraction in hypersensitive individuals, the severity of the reaction depends upon the amount of lens matter left in the eye, and upon the extent to which it is protected by the collapsed capsule. In some cases the reaction may subside while a large amount of lens substance still remains closed off within the capsule. A discission of the lens capsule will then lead to a renewed inflammatory reaction.

It is probable that the severity of phacoanaphylactic endophthalmitis also may partly depend upon the degree of sensitization to lens protein. Our clinical data, however, are insufficient to establish this as a fact, but it is indicated by the results of the histologic examinations, as noted above.

Judging by our skin tests, individuals hypersensitive to lens protein are more sensitive to normal lens matter (immature cataract) than they are to the cortex of a fully mature cataract, and our histologic findings seem to indicate, that in hypersensitive individuals normal lens matter is more pyogenic than is cataractous lens matter.

Our tests made upon human subjects afford interesting confirmation of the facts, previously demonstrated in other ways by animal experimentation, that lens protein is not species specific, and that an individual may be hypersensitive to the protein of his own lens. For we found that patients hypersensitive to pig lens were also hypersensitive to ox lens and human lens; and that the one individual hypersensitive to pig lens who was tested with protein from her own immature cataract, gave a positive reaction to the latter.

In cases of hypermature cataract, the fluid cortex is said to be especially irritating to the eye. We have had opportunity to examine microscopically two eyes with Morgagnian cataracts, in which there had been rupture of the lens capsule without history of injury. The changes in each eye differed only in degree. In neither eye was the nucleus infiltrated with pus cells. The cellular exudate which came chiefly from the iris, consisted exclusively of endothelial cells, except in the more marked case, in which there was an insignificant collection of pus cells at one place on the iris. The endothelial phagocytes were collected in abundance on the anterior surface of the iris and on the posterior surface of the cornea. The iris was free from infil-

tration, lymphocytes and plasma cells, and in the more marked case had undergone almost complete necrosis. In this case there was also hypopyon of 1.5 mm., composed entirely of endothelial phagocytes, mixed with a slight amount of blood. In the other case, also, there was a slight amount of blood in the anterior chamber. These findings are markedly different from those in our cases known to be hypersensitive to lens protein, as well as from those in our series of untested cases in which the cataract was not hypermature, and strongly indicated that the irritation to the eye produced by Morgagnian fluid is not a reaction of anaphylaxis but is analogous to that produced by any necrotic tissue. If the patient should happen to be sensitive to lens protein, there would, of course, be superimposed a phacoanaphylactic reaction.

TREATMENT.

The treatment of phacoanaphylactic endophthalmitis should consist in the use of atropin to dilate the pupil, and of hot fomentations to control the pain. If the patient proves to be sensitive to atropin, hyoscin may be employed instead. If only a small amount of lens matter remains in the eye, or the latter is well protected by the capsule, no other treatment may be needed. If the condition does not subside within a reasonable time, a linear extraction should be performed and the lens matter thoroly removed by irrigation. This procedure should also be employed in cases in which the intraocular pressure becomes greatly elevated.

In cases which have reached a chronic stage owing to the lens matter having been closed off by fibrous tissue, the process could, perhaps, be checked by immunizing the patient by means of repeated injections of lens protein. Probably, however, linear extraction would be preferable in these cases also.

In connection with prophylaxis, tests with lens protein preceding operation would seem to be of considerable value, especially in cases of congenital and immature senile cataract. In cases of fully mature senile cataract, or of sclerosed lenses, a positive test would emphsize the importance of removing all cortical matter possible. In cases of congenital cataract, it would indicate the employment of free discission followed by early linear extraction, or, possibly, an attempt to immunize the patient to lens protein before operation.

In cases of immature senile cataracts, a positive test would indicate the advisability of postponing operation, if possible, until the cataracts had fully matured. When this would entail too much loss of time, and the patient is over 50 years of age, an intracapsular operation should be performed upon one eye, and the cataract in the other allowed to become mature.

In the case of a patient under 50 years of age with immature cataract, it might be well, owing to the danger of rupture of the capsule, to attempt to produce immunity to lens protein before operation. After such immunity had been established, it might be possible in such a case to employ discission of the cataract, followed by simple linear extraction. (Since this was written we have succeeded in immunizing such a patient, judging by the fact that he now gives a negative skin reaction, whereas he gave an intensely positive test before treatment with lens protein. The details of this case will be reported later. (See p. 700.)

SUMMARY AND CONCLUSIONS.

In a series of twelve cases of rupture of the lens capsule, traumatic, operative, or spontaneous, in which there occurred intraocular inflammation apparently due to lens matter, a positive skin reaction to lens protein was obtained in every case.

Microscopic examination of five eyes from these cases showed a characteristic histologic picture in each.

In a series of twenty-eight cases of rupture of the lens capsule, in which there occurred no intraocular inflammation, a negative skin reaction to lens protein was obtained in every case.

In a series of fifty unselected cases of various kinds, there was a positive skin reaction to lens protein in four cases.

An individual hypersensitive to lens protein of the ox or pig is also hypersensitive to the protein of his own lens.

Experiments on guinea pigs seem to show, that free discission of the lens capsule of an animal sensitized to lens protein causes a marked intraocular reaction with characteristic histologic changes.

Inflammation resulting from lens matter in the eyes of individuals hypersensitive to lens protein, we have termed phacoanaphylactic endophthalmitis.

Intraocular inflammation resulting from rupture of a Morgagnian cataract is not usually phacoanaphylactic in nature.

All patients with congenital or immature cataracts should be tested with lens protein before operation.

In the case of a patient with cataracts in both eyes, and over fifty years of age, who is found hypersensitive to lens protein, the cataract in one eye should be removed in capsule, or operation postponed until it is fully mature. If the patient is under this age, an attempt should be made to immunize the patient before operation.

The best treatment for severe phacoanaphylactic endophthalmitis is removal of the lens matter by operation.

Serum and Vaccine Treatment for the Prevention and Cure of Cataract.

Dr. A. Edward Davis, New York City. In 1902 and 1903, under the direction of the late Dr. Justin DeLisle, sera were obtained from rabbits immunized against human cataractous lenses, and rabbits immunized against normal guinea pig lenses.

In these experiments an attempt was made to dissolve or absorb the guinea pig cataractous lens, both *in vitro* and *in vivo* with antilens serum, and in each instance only a partial success was obtained. With the human cataractous lens, the attempt to dissolve the lens was made only *in vitro*.

Most of the cytolysins are *species* specific; that is, they react only on the species from which the tissue or antigen is obtained. A few of the cytolysins are *organ* specific to a greater or less degree, e. g. spermatozoa, the testicle, the ovary, and of the tissues of the eye, the crystalline lens and the uveal pigment. Very recently Hektoen has called attention to the specific precipitin reaction of the lens, and cites Uhlenhuth, who first called attention to the fact that the lens of different species give the same immune reactions, that is, that it is *organ*-specific and not species-specific. Hektoen (loc. cit.), after numerous experiments with lens antigens of different animals, arrived at the conclusion that the *organ*-specificness of the lens holds good thruout, and that the lens does not appear to contain any *species*-specific antigens; hence the lens protein may be regarded as chemically distinct, and as identical in diverse species.

Guyer and Smith call attention to the fact that all cytolytic sera, so far studied, have been found to be more or less hemolytic in action. Like the hemolysins, they are also specific in action on the special tissue used as the antigen in the sensitizing process. However, they are not absolutely specific in action, as homologous tissues may be affected, to a slight extent, e. g., the vitreous when lens cells are used as antigen.

Bearing in mind all the limitations of specificity of action of the different cytolytic sera so far developed, and the dangers that may be incurred by their lytic action on the cells of the homologous tissues, other than the tissue cells furnishing the antigen, the experiments on the human subject (related in detail below) were proceeded with, on the basis that the main action would be on the tissue cells used as antigen, especially on organ specific antigens.

There is one real danger, and that is anaphylactic shock, more or less severe in character, which at times follows the intravenous injection of the lens antiserum and lens vaccines.

Chemical Composition of the Crystalline Lens. The greater part of the solids of the crystalline lens consists of proteins. The actual percentage of the various solids in beef lens is as follows:

Protein	35.00
Fat and Lipin	0.75
Salts	0.75
Water	63.50

The protein constituents have been divided by Morner into two parts, the albumoids and the crystallin. Albumoid is found in the lens fibers and is insoluble in water and in salt solution. It dissolves readily in dilute acids or alkalies. The crystallin (A and B crystallin) are globulins, and are soluble in water and in salt solution.

Jess has shown, that in the senile cataract of oxen the crystallins are transformed in part to albumoid. According to Hammarsten, the relation between albumoid and crystallins is changed with increasing age, the albumoid increasing, the crystallins decreasing. In normal lens, the relation of the crystallins to the albumoid changes correspondingly from 82:18 in youth to 41:59 in old age; in senile cataract the relation can be changed to 25:75. The other constituents of the lens remain unchanged.

Experiments. The first experiments were concerned with the effect of intravenous injections of antilens serum on patients suffering with cataract. The antilens serum was prepared in three different ways:

(1) By immunizing rabbits against normal guinea pig lenses. (Anti-guinea-pig-lens rabbit serum.)

(2) By immunizing rabbits against human cataract lenses. (Anti-human-cataract-lens rabbit serum.)

(3) By immunizing a sheep against normal beef lenses. (Anti-beef-lens sheep serum.)

In view of the great similarity in chemical composition of cataract to normal lens, there seemed to be no reason for confining the study to the effect of anticataract lens serum. The comparative scarcity of cataracts would have made such a study impracticable. Hence the use of sera from animals immunized with normal guinea pig or beef lenses.

Later on, the unpleasant effects of the serum led to a study of the effects of lens antigen when injected directly into patients with cataracts. This also appeared more rational on theoretic grounds, as more lens antibody was probably made available by active immunization than by attempts to confer a passive immunity with serum.

1. *Preparation of anti-guinea-pig-lens rabbit serum.* Fresh guinea pig lenses were removed under sterile precautions, ground in a mortar and suspended in normal salt solution in the proportion of one lens to each cu. cm. of salt solution. The suspension was then centrifuged to remove coarse particles, and the supernatant opalescent fluid preserved in vaccine bottles. To insure sterility, a few drops of chloroform were added to each bottle, and the preparation stored in the refrigerator.

Two large rabbits were injected intravenously every day for six days with small doses of guinea pig lens extract. Ten days after last injection, they were killed by bleeding and the serum preserved.

2. *Preparation of anti-human-cataract-lens rabbit serum.* Human cataract lenses which had been recently removed at operation were dried over anhydrous calcium chlorid, then ground to a powder in a sterile mortar. The powder was then suspended in normal salt solution in the proportion of one lens to 2 c.c. of saline, the coarser particles removed by centrifuge, and the supernatant fluid decanted into sterile bottles. A few drops of chloroform were added for preservative.

Two large rabbits were injected intraperitoneally once a week for six weeks with 5 c.c. of the lens extract.

Two other rabbits were injected with cataract lens extract intravenously. The injections were given daily for seven days. Dosage: 0.5 to 1 c.c. of extract. These rabbits were bled to death and serum preserved on ice.

Other rabbits were also injected with cataract lens extract intravenously:

3. *Preparation of anti-beef-lens sheep serum.* Fresh beef lenses were removed under sterile precautions and dried in a vacuum oven at 35° C. The dried lenses were then pulverized in a sterile mortar and the powder preserved in a sterile glass bottle.

The lens extract was prepared as follows:

Powdered lens	10. gm.
Sodium carbonat	0.5 gm.
Sodium chlorid	0.85 gm
Distilled sterile water..	100. c.c.

The solution was centrifuged to remove coarse particles, and the opalescent extract preserved by the addition of a few drops of chloroform.

A sheep was injected intravenously every four to seven days with the beef lens extract. From time to time the sheep was bled and the serum preserved for further study, and for therapeutic inoculations.

The serum from a rabbit was tested for precipitins against cataract lens, after having received 12 intravenous injections of human cataract lens extract. Stronger solutions proved positive; those of 1:10,000 and weaker were negative.

Report of Cases—These patients, 13 in number, were inmates of the State Hospital for the Insane, Central Islip, N. Y. All injections of serum and vaccine were generally administered intravenously.

(1) In these experiments both sera and vaccines have been used, and in some patients both the sera and vaccines at different periods of the treatment. Altho it was known that the lens antigen was organ-specific in its action, nevertheless, it was thought that lens antigen from the same species would possibly produce a more powerful serum than lens antigen from a foreign species. Accordingly at first only the human lens antigen was used. Subsequently, because of the difficulty in securing sufficient human lenses, beef lens antigen was used in the preparation of antilens sera. The reason for changing from antilens sera to lens vaccines, in the same patient, was twofold. The intravenous injection of serum, when increased up to 5 c.c. and sometimes much less quantity in female patients, caused marked anaphylactic shock; and it was thought perhaps that the *active* stimulation of lens antibodies in the patient by injections of vaccines, would have a more lytic or dissolving action than the *passive* treatment by means of the very small amount of lens antibodies contained in the serum injected.

It was found by actual experience, however, that the lens vaccines also produced shock, when given intravenously and carried up to as high as 5 c.c., or even less quantity. Because of this shock effect, which at times was quite alarming, both with the sera and vaccines when given intravenously, we finally decided to give all injections, sera and vaccines, subcutaneously. Since this method was adopted, no symptoms of shock have followed.

(2) *Source and strength of the sera*: Since the lens is organ-specific and not species-specific, the question of securing sufficient lens antigen to manufacture antilens serum has been greatly simplified, since beef, sheep, swine lenses can be had in any quantity; and sheep, cows or horses, even, can be used as the source of the sensitized serum. In our experience, instead of using human lenses as the antigen, and rabbits as the source of the sensitized serum, we used beef lenses as the antigen and a sheep as the source of the sensitized serum. This is a practical method, and if the treatment ultimately proves successful, there will be no lack of remedy with which to treat patients.

(3) *Standardization of the sera*: So far we have not been able to have a standardized serum, but trust to have this later. Guyer and Smith state that in their experiments, inasmuch as they had no visible way to tell when serum is adequately sensitized for use as a cytolysin beyond trying it out directly, a series of lens precipitin tests were made with various of the fowls (which they used as the source of sensitized serum) after the fifth and sixth injections of antigen, respectively, in order to be sure they were responding to the lens proteins. They do not claim a necessary connection between the precipitin and cytolysin reactions of the blood, but it is thought that if the lens had so sensitized the fowls, that precipitins were formed, one might infer that cytolysins had also been generated. It is possible, therefore, and feasible to test the animals (rabbits, sheep, etc.) we are now using as the source of the antilens sera, in the same manner to determine if the sera are strongly sensitized with cytolytic substances.

(4) *General reactions:* First to be considered is shock. Several of our

cases suffered more or less severely from shock, both with the sera and vaccines, at times even when small doses were administered intravenously. The whole surface of the body, within sixty seconds would turn intensely red, then after a few moments would become more or less livid; labored and irregular breathing with great dyspnea, rapid weak pulse, which at times was quite irregular, great restlessness, at first quickly followed by marked general weakness, and in the severe cases of shock there occasionally was involuntary movement of the bladder and bowels. Perhaps the most distressing symptom was that of impending suffocation. The blood pressure following shock varied; in most of the cases it was lowered; however, in others it was elevated. As regards temperature, unfortunately this was not taken in our cases, except in a few instances. In animals, usually, there is a marked drop in the temperature following shock, and Pfeiffer states that by this symptom alone the mildest anaphylactic reactions may be detected, even when other symptoms are not present.

The general effect of the prolonged administration of antilens sera and vaccines is that of anemia, more or less pronounced. In one of of our cases the patient became pale, lost weight and appeared to be "drying up," as one of the staff at the hospital remarked. This patient never suffered shock, or had any other ill effect from the injections, except that he gradually lost weight without any apparent cause, and for this reason alone the injections were discontinued.

A third general symptom that appeared in one case, was an extensive urticaria, manifesting itself as large wheals, an inch or more in diameter, elevated above the surrounding skin surface, which covered most of the body, lasted a few days, then disappeared. No other patient was similarly affected. All of the patients treated, except one or two, responded to the sensitization tests when a small amount of the serum or vaccine, with which they were being treated, was injected intradermally.

(5) *Local reactions:* How and why the antibodies contained in sentitized sera, or the antibodies produced by the injection of the vaccines directly into the animal, act selectively and specifically on the tissues used as antigen are still conjectural. All we know definitely is, that they have a more or less specific action, the sera acting passively and the vaccines actively.

Guyer and Smith (loc. cit.) in their extended experiments on pregnant rabbits and mice with fowl serum sensitized to rabbit lens and mice lens, respectively, have noted opacification and liquification of the lenses of the young, but never in the mothers, who were directly injected. In the case of one young mouse, the lens in one eye was rendered opaque, and in the other eye, the lens was liquified. In no instance were the lenses of the mothers affected. Their comment relative to this point is as follows: "In so far as the literature on cytolysins records positive results, it leads one to expect specific effects in the immediate animal injected. A possible explanation of the lack of effect on the mother may be that because of the meagre circulation of blood in the lenses of adults, the quantity of cytolytic serum which reaches a lens is insufficient to affect it."

On the lenses of the developing young *in utero,* as is well known, there is a vascular membrane, and the cytolytic substance can reach these lenses and have a much greater effect. Furthermore, such developing lenses are softer and have not the fibrous masses which obtain in older animals. Guyer anr Smith attribut the *liquefaction of lenses,* observed by them in the young of rabbits and guinea pigs, to a true cytolytic action of the sensitized serum used by them. Whether clouding and opacifying which occurred in other of the lenses should be regarded as the result of cytolysin or of a precipitin, they regard as problematic.

A further possible explanation of why cytolytic sera do not affect the lenses of adult animals or man powerfully, may be the lack of alexin or complement in the aqueous humor of the anterior

chamber of the eye. This fact would suggest one practical point in the attempt to absorb or liquify cataracts in the human animal, that is, during the period that the vaccines are being given, the eyeball should be massaged, or subconjunctival injections of some slightly irritating fluid be given—in fact any safe means employed that would induce an increased flow of the plasma and along with it leucocytes into the anterior chamber of the eye; because it is absolutely necessary to have complement or alexin present in conjunction with the antibodies of the sensitized serum, in order to obtain a lytic effect—that is, absorption or liquefaction of the lens.

(6) The local effects of sera and vaccines on the cataractous lenses, that is, as regards mature and immature cataracts, were exactly the opposite to what we had preconceived at the beginning of the treatments. We had supposed that the immature cataracts with the scattering or partial opacities would be most vastly affected. It proved to be exactly the contrary. The only two patients in whom we obtained partial liquefaction of the lenses, were those having mature, gray, senile cataracts, where a great part of the cortical layers were absorbed. The sera and vaccines seemed to have no liquefying effect on the spiculæ in the incipient cases.

(7) It may be asked, why should these insane patients blinded by cataracts be subjected to more or less risky treatments? For two reasons: first, many of these patients cannot be operated upon for the cataract because of their disturbed condition, the patient destroying the eye at the time of the operation, or subsequently, before the wound is healed, by his violent actions. No such risk to the eye is incurred when vaccines and immunized sera are given; second, when these antilens sera and lens vaccines are given subcutaneously or deep into the tissue, no more risk is incurred to the patient's general condition, than is now taken daily by injecting the various bacterial vaccines and sera—for instance, diphtheria antitoxin. The general condition of these insane patients is often greatly improved by the removal of cataracts; therefore, if we can devise a safe means for the absorption of their cataracts, even in the most disturbed cases, we will have accomplished a great advance in their treatment. Furthermore, the full consent of relatives or friends was obtained before these experiments were started.

(8) Twelve of these patients were bled on Dec. 24, 1921, and precipitin tests on their sera were made, which proved inconclusive.

Precipitin Tests on Sera of Patients Treated With Lens Antigen.

No. of Case	Dilution of Lens Antigen 1–10	Dilution of Serum 1–10	1–100	1–200
2		—	—	—
3		+	—	—
4		—	—	—
5		—	—	—
6		—	—	—
7		—	—	—
8		—	—	—
9		—	±	—
10		—	—	—
11		—	+	—
12		—	—	—
13		—	—	—

Conclusion. No definite conclusions can be drawn from so few cases as here reported. The partial results so far obtained would seem to indicate: First, that mature, senile cataracts (at least the cortical layers) may be absorbed or liquified; second, a possibility that immature cataracts may be retarded or entirely checked in their progress. The present paper is to be considered simply as a preliminary report, to be followed by further and more extended experiments.

Phacoerisis.

Prof. I. Barraquer, Barcelona, Spain. Daviel proposed the total extraction of cataract, but on account of its technical difficulties he resorted to cystotomy. The varied procedures that have been employed are conclusive evidence of the general desire to remove all soft cortical matter if possible. In spite of these modifications of the operation, and the complementary operations like preliminary iridectomy, ripening, etc., total extraction is the only rational way of removing cataract. It removes the cause

of postoperative inflammation but it introduces operative dangers. Being convinced that the best method would be one that pulled the lens out in its capsule, the first idea was to use forceps that would not tear the capsule. Later it was thought a small cup adapted to the anterior face of the crystalline should be able to seize it and break the zonule. Many variations of apparatus and of vacuum were tried before succeeding and removing entire the cataracts with a minimum number of ruptures of the capsule. Pulling on the zonular fibers must predispose complications in the ciliary region.

The first instrument was a pneumatic forceps to which the present one adds a cutter of the zonule. Frequent, small tugs are made by rapid, vibratory motions, so as to rupture the zonular fibers near the crystalline without having the force extend to the ciliary region. The vibrations should be adjusted to the hardness of the lens and the resistance of the zonule. The vacuum should be proportioned to the hardness of the lens, and the frequency of vibration to the elasticity of the zonule. My early statistics were impaired by chronic iridocyclitis due to inclusion in the corneal wound of zonular fibers, or to inclusion of angles of the coloboma of the iris. Such inflammation was rare without iridectomy. I therefore make a simple extraction, adding a small peripheral opening in the iris. The only instrument introduced in the eye is the erisiphake. Postinflammatory reactions are due to (1) cystotomy, numerous maneuvers and (2) remnants of degenerative crystalline and capsule. (3) Incarceration of capsule does not exist. Infections are very rare because the conditions that favor them are absent.

The technic is easy but requires attention to details indispensable for a good result. The patients are examined with the pupil dilated with euphthalmin, with the binocular microscope and slit lamp to ascertain the characteristics of the cataract, etc., in order to grade the vacuum and the number of vibrations per minute, as well as to learn the maturity of the cataract and the freedom of the eye from sepsis. The incision includes two-fifths of the corneal circumference with a conjunctival flap in which a suture may be placed. The erisiphake is introduced and applied on the anterior surface of the lens at the center of the pupil, its lower edge passing somewhat behind the iris; then the vacuum is produced and the zonular fibers broken. Then slowly rotate the lens, turning it so that its lower edge is turned up. Eserin ointment is used, that the miosis produced may prevent incarceration of the zonular fibers; and to prevent squeezing of the lids, paralysis of the orbicularis is advised.

By varying the vacuum and the frequency of vibrations, all kinds of cataract may be extracted from patients over 40 years of age, and also in some younger patients. I have operated on more than two thousand cases and the only accidents of my later statistics are:

1. Difficulty of making a peripheral iridectomy on account of dilatation of the pupil.

2. After incision, sometimes the pupil contracts so as to make difficult the proper placing of the cup. In case of seizing the iris between the cup and crystalline, after turning the lens suspend the vacuum so as to release the part and then catch the lens again.

3. Rupture of the capsule. (a) On taking hold of the cataract and employing too intense a vacuum. (b) In young patients a resisting zonula may be opened below. (c) On finishing the extraction the lip of the wound may break the capsule by pinching. The contents escape in the eye and the conjunctiva. Rupture has no inconveniences other than the conversion of total extraction into cystotomy. It is infrequent when one has had practice in the procedure.

(4) Loss of vitreous occurs only when undue pressure is made on the globe by the operator or patients. It is very rare with the induced temporary paralysis of the orbicularis.

Postoperative complications do not occur without some operative accident or error of the patient. Iritis may follow pinching of the iris. If the capsule has been broken, the complications are such as follow cystotomy. In vitreous prolapse, if it be cut off and the wound closed with a suture, the pupil becomes black, central and round, and only slight

opacities of the vitreous arise and disappear slowly. In restless patients or those who have a cough, or tend to vomit, or who receive a traumatism, a peripheral opening in the iris limits the effects to slight conjunctival reopening of the wound and hyphema, which disappears in 24 hours or less.

Study of the clinical history of the patients shows that all accidents have their source in lack of forethought or technic, or of docility on the part of the patient. The maximum security attends simple extraction, peripheral iridectomy, conjunctival suture, and orbicularis paralysis. Convalescence is abbreviated, and good or normal vision assured.

Operation of Barraquer.

PROF. GALLEMAERTS, Brussels. Extraction of the crystalline in its capsule has been practiced at different periods and its advantages and inconveniences have often been discussed. But because of the inherent difficulties of its execution without depreciation of the eye it has been abandoned.

The operation of Smith and that of Barraquer present anew this problem. I have reported 24 cases operated on by the method of Barraquer, 6 of them under the direction of that master. This communication deals with the accidents that have occurred to me in the 46 such operations I have practiced. Their description may enable those who wish to undertake the new method to diminish the number of their failures.

Every detail regarding the instrument used should receive close attention. The motor should be cleaned, the oil used freed from impurities by filtering thru animal charcoal. It is well to empty the instrument of oil after using it and clean the motor with gasoline. The suction tip must be carefully cleaned of all debris and blood that may be drawn into it, and the power of suction tested before applying. A vacuometer may be attached by intercallating a T-tube. A suction of 55 or 60 cm. can be produced in 4 or 5 seconds. This method of watching the vacuum is not only useful but indispensable.

PREPARATION OF THE EYE.

The prolonged preparation of the patient has been found useless or even harmful. The eye is examined with a slit lamp both to reveal better the form of cataract and to examine the state of the iris. Of 45 cases thus examined, 19 showed degeneration of the pupillary margin, and twice there was atrophy of the posterior layer of the iris. The evening before the operation, the eyes are freely bathed in sterile solution and the permeability of the lacrimal passages tested. The eye is then bandaged after application of 3 per cent silver nitrat, and dressing the eye. An hour before operation, euphthalmin and cocain are instilled. An injection is made into the temple to paralyze the lids and prevent them from squeezing.

OPERATIVE TECHNIC.

The vacuometer and instruments are placed upon a table to the right of the operator, and the apparatus tested just before proceeding to make the corneal incision. The lids are retracted with a Desmarres retractor or with a strabismus hook, which can be more readily introduced and removed. The upper lid is controlled with the hook held in one hand while the other hand draws the lower down. The corneal incision is made in the usual manner, but should include two-fifths of the cornea. It is made in the limbus and completed with a conjunctival flap. A small peripheral iridectomy is made, the operator holding the upper lid with his finger against the margin of the orbit and seizing the iris with a forceps or Tyrrel hook. If there is blood in the anterior chamber, this may be washed away with sterilized solution. Then the operator replaces the strabismus hook under the upper lid, holding it with the left hand and directing the patient to look down and remain quiet. When a vacuum or 55 or 65 cm. has been produced, the suction tip is introduced laterally from the temporal side for the right, and from the nasal side for the left eye. The tip is passed under the margin of the pupil and after it has been accurately placed on the crystalline the button is pressed to establish the communication between the tip and the vacuum. At this instant the vacuum descends to 45 cm. but quickly regains its former state. The tip is then drawn upon, sliding the crystalline in its fossa with a rocking

movement of the handle of the instrument. When well done, this brings the lens with its posterior surface forward. After the crystalline is removed, a solution of eserin in oil is instilled, and some minutes allowed to pass before the iris is reduced by use of a spatula bent at a right angle. The eye is closed with a binocular bandage and dressing. If the patient makes no complaint the dressings are left on the nonoperated eye until the fourth day, and on the operated eye until the seventh or eighth day.

Gallemaerts has seen prolapse of the vitreous occur when the dressing was removed on the sixth day.

Too small a wound impedes the introduction of the tip and the escape of the crystalline. In such a case the incision should be extended by straight scissors with short strong blades. If the conjunctival flap begins too low, it hinders the introduction of the tip. This difficulty has been encountered twice. It requires changing the point of introduction of the tip or raising the flap with forceps. Seizing the iris causes pain and hemorrhage. Detachment of the iris may be produced during the withdrawal of the lens. If this happens the connection with the vacuum should be broken and the tip withdrawn and reintroduced. Hemorrhage into the anterior chamber is usually removed easily by lavage. But in one case a large clot occurred that could not be thus disposed of. Gallemaerts changed the operation of Barraquer into that of Smith, and by pressure with a strabismus hook expelled the lens without loss of vitreous. The most frequent operative accident is failure of the lens to adhere to the tip, or its escape during withdrawal, which is indicated by a characteristic sound. After this the tip should be rapidly removed. In one case the crystalline caught in the opening made by the peripheral iridectomy, and before reintroducing the tip the remaining strip of iris was divided. If other conditions remain favorable, the tip may be introduced several times. He has succeeded at the fourth introduction. But care must be taken not to aspirate the vitreous. In a third attempt, at aspiration there suddenly occurred a sound of suction and the eye collapsed. In spite of the enormous loss of vitreous the lens was extracted with a Snellen loop, but the eye was shrunken. There was no complaint the following day and the dressing was allowed to remain a week. To the operator's great astonishment, the eye had completely restored itself, the wound was united, the patient could see and later gained vision of 6/10. Of all the operations Gallemaerts has done, this was the most extraordinary.

Luxation of the crystalline is a most serious accident. Sometimes it occurs directly upward. It can then be made to slip down with the help of a spatula and another attempt made at aspiration. When the vitreous gets in front of the lens, the only resource is to extract the lens with the loop. Escape of vitreous before introduction of the tip has not occurred in this series. In 2 cases the iris has formed a funnel with the crystalline at the bottom of it. The cornea was rigid and protruding instead of collapsed, and separated from the crystalline by a wide space. The cornea collapsed upon introduction of the spatula. Escape of vitreous may occur after removal of the lens. Sometimes it presents but a moment in the wound; sometimes it bulges between the lips of the wound and the hernia should be excised with the scissors. If a hernia persists for some days, it may be covered with a conjunctival flap. In 2 cases thus treated rapid union was obtained.

RESULTS OF OPERATION.

There is often striate keratitis, which rapidly disappears leaving no trace. In one case the vitreous became attached to the posterior surface of the cornea and caused a dense opacity. Incarceration of the iris in the angle of the wound occurred in one-half dozen cases. In 7 cases the pupil was deformed, deviating upward. But this complication is less serious than with capsulotomy. It is interesting to examine the eye afterward with the slit lamp. The vitreous has been found to protrude thru the pupil in the shape of a mushroom. In one case there was detachment of the retina. Barraquer has stated there could be no adhesion formed between the iris and vitreous, but in one case a very distinct

adhesion of the vitreous to the margin of the pupil occurred. The extraction had been normal. In 2 cases in which the loop was employed, a white mass formed covering the pupil. One of these had been almost completely absorbed and the other was undergoing absorption. The vision obtained was less than one-tenth, 3 cases; one-tenth to four-tenths, 24 cases; five-tenths to seven-tenths, 5 cases.

A critical point in the operation of Barraquer, that upon which success depends, is the moment of pressing the button connecting the tip with the vacuum. An instant of inattention may defeat the operation, or the failure may arise from fault of the apparatus or some untimely movement. It is to reduce such dangers that Gallemaerts has modified the Barraquer instrument. Pump, vacuometer and tip are carried on an adjustable support that can be moved vertically on a rod. If the tip can be modified to make it adhere more securely to the lens, the chances of failure will be reduced to a minimum. It has been denied that the apparatus of Barraquer gave a vibratory vacuum. Gallemaerts and Kleefeld tested this by attaching it to a cylindric box, one end of which was readily movable and carried a mirror that reflected the light of an electric lamp. When the machine was started a very noticeable rapid vibration of the mirror occurred. This was shown by the movement of a beam of light reflected from the mirror. By placing in the path of the light a photographic film, the record of the vibrations was obtained.

Ocular Lesions From Watching Eclipse.

Dr. D. Kostitch, Belgrade, Jugo-Slavia. The literature of the subject from the time men were blinded by exposure of their eyes to the direct rays of the sun in Syracuse, to the recent papers dealing with the eclipse of 1912, was very briefly reviewed.

The symptoms begin with impairment of vision by prolonged and extreme after images, which may be green, yellow, red, violet or black. The scotoma thus caused may involve the whole word in reading, or only some letters. Some patients complain the letters look as if covered by a spot of ink, which in one case covered only two or three letters, having a greenish-blue color. The ophthalmoscope may show no visible change in the retina, but in the more severe cases the macula seemed a darker red or later shows increased pigment; or there may be early edema. Most frequently it shows one or more dark red spots indicating congestion. Retinal hemorrhage, or white spots have been noted, even hole in the macula. The views of various writers as to the pathogenesis of such lesions are briefly stated. The central or paracentral scotoma produces the lowering of visual acuity. Serious lesions are likely to be produced in those who are emmetropic or have hyperopia that they habitually keep corrected. One patient seen by Kostitch, who had one emmetropic and one slightly myopic eye, suffered central scotoma only in the former, altho no attempt was made to protect the other. Kostitch believes that the luminous rays are those which produce these lesions. The prognosis must always be guarded, but the great majority of cases recover altho sometimes the subjective dazzling and quivering last for many months. In a few the central scotoma is permanent.

Following the eclipse of the sun, April 9th, 1921, which was seen at Belgrade, Kostitch saw 20 cases of ocular troubles caused by looking at it without protection of the eyes. Of these 19 were in college students. Most of them recovered in a few days, several after three or four months. But two showed little or no improvement at the end of five months. The treatment regarded as most effective was complete rest of the patient, abstinence from reading, writing, etc., and the use of sodium iodid. The patients were advised to spend their summer vacation in the country.

Superiority of Organic Grafts of Dead Tissue in Establishing a Mobile Stump in the Orbit.

Dr. A. P. Magitot, Paris. Since the year 1885, in which Mules proposed enclosing a glass sphere in the sclerotic in order to create a mobile stump, numerous authors have repeated the operation. The question was also discussed

in many scientific meetings, and particularly in 1900 at the International Congress of Paris. It would seem that it might be treated anew in order to determine the results obtained by clinical practice. Moreover, during the last few years, experimental researches on grafts of dead tissue have brought fresh data, by which ophthalmologists should profit in their choice of the substance to be inserted in the funnel of the ocular muscles.

Tho making no pretention to writing the history of the question, we think, that it is necessary to recall the successive stages followed by the different operators. Mules in 1884, had at the same time as von Graefe proposed the amputation of the anterior segment and the evisceration of the eyeball in all cases in which total extirpation could be avoided. In 1885 he proposed closing a glass ball in the sclerotic; in the following years Brudenell Carter, A. Frost, Grimsdale, Lang, Kroll and Kross, Bickerton Swanzy in England, L. W. Fox and Orax, Reeve, de Schweinitz, Buller in America, experimented with the method. The enclosure of a glass sphere in Tenon's capsule was also tried. Later on numerous substances were proposed, rubber (Pick), celluloid (Lang), paraffin wax (Hepburn), asbestos (Claiborne), the pith of the elder tree (Elschnig), etc., but the preference of the authors was for precious metals. Kuhnt (1887) had enclosed silver spheres in the sclerotic, but two years later Wagenmann had occasion to study some of his stumps and came to the conclusion that dangerous inflammatory reactions might be produced. Operators then returned to spheres in platinum and particularly in gold. We know that many American ophthalmologists have made use of this substance, and that certain of their patients have preserved a mobile stump for many years.

To-day, 26 years after Mules' communication, we are able to measure the ground covered. To judge by the results obtained and the opinions published, it seems that many ophthalmologists are agreed to attempts to make a mobile stump in all cases where there is no orbital infection. Some are in favor of evisceration with inclusion of a glass or gold marble. Others, fearing sympathetic ophthalmia, prefer extirpation and planting a sphere in Tenon's capsule. These two methods constitute in fact a part of the foundations on which rests the problem to be solved. The other part is constituted by the choice of the substance to be enclosed.

If we are to judge by the number of illassorted substances which have been employed, this second part of the problem is not the least important. Many substances have not given satisfaction, others are heavy, others are rare and costly. Those which have been employed most often are glass and gold, as being the ones producing the minimum of painful or inflammatory reactions. As a corollary, it is patients operated in this way who have most frequently been presented in scientific societies.

However, for an operation not to have come into universal use, in spite of the examples of wearers of gold or glass spheres who have been operated ten or fifteen years previously, it must have aroused some hesitation and distrust. Many hold that we have not yet emerged from the experimental stage, and leaving to others the onus of experimenting, reserve their opinion until they shall be convinced of the excellence and innocuousness of a method.

Indeed, in spite of a few cases remarkable for their duration and the esthetic effect obtained, it must be confessed that the inclusion of a gold or glass sphere does not always succeed. Precocious or tardy expulsion may take place when the operation has succeeded, and after a lapse of several weeks; it is therefore impossible to assert that the mobile stump will be permanent.

ORGANIC AND INORGANIC SUBSTANCES.

The expulsion of a gold or glass sphere may take place shortly after the operation, when the asepsis has not been perfect or when an accident occurs, such as a hematoma which distends the tissues and brings about rupture of the sutures. But this expulsion can also take place several years later, as if there had been a sort of wearing out of the conjunctiva which covers the sphere. This tissue gradually becomes thinner, a small orifice appears which grows progressively, and

one day the sphere escapes from the cavity without there having been properly speaking any suppuration. Such an accident may supervene just as well as with other inorganic substances such as ebonite, galite, celluloid, asbestos, agar-agar, etc.

As for paraffin wax injected under pressure or fashioned into a ball (Brockart, Camann, M. Ramsay, and Spratt) it likewise has caused many disappointments. Generally speaking its point of fusion is too low. When it is 75 degrees centigrade (like that used by Hertel) its superiority over ebonite lies only in the facility with which the operator can give it the desired shape.

It was certainly for the purpose of obtaining a permanent stump that recourse was had no longer to an inorganic substance, but to living tissue. Baraquez, Verlez, Bartels, Marx, Lauber recommended the use of fatty tissue, usually taken from the abdomen of the patient and enclosed either in the sclerotic or in Tenon's capsule. This method has been repeated sufficiently often these last few years for it to be possible to judge of its value. The results of recent operations are good, those of long standing are disappointing. As Marx has noted in his histologic examinations, the graft is reabsorbed, and the stump becomes of insignificant volume. In 1912 Sattler, and in 1914 Carlotti and Bailleul tried successfully on man the graft of living cartilage, but the long standing results of their transplantations have remained unknown. In 1915 I in my turn tried this method on men wounded in the war, and I was able to convince myself that it offered many serious inconveniences. First of all must be placed the extreme sensitiveness of this tissue to infection, and in consequence of this frequent premature eliminations. Secondly, living cartilaginous tissue, like fatty tissue, is reabsorbed in a few months. This disappearance is the more rapid as the thin and flat human costal fragment is far from being sufficiently voluminous to constitute (even in the beginning) a good stump.

We shall merely make a passing mention of the living heteroplastic grafts of dogs' or cats' eyes (Lagrange, Rohmer, or Boiadeff) whose atrophic evolution is similar, and we shall now speak of a very interesting category of substances. We refer to dead organic transplantation.

Belt, shortly after Mules' communication had the idea of implanting in the Tenon capsule a piece of sponge, following in this a study of Hamilton's which appeared in 1881. Hamilton had repeated experiments already made by Stricker (of Vienna), consisting in keeping under supervision the evolution of aseptic sponges introduced into the peritoneum of laboratory animals. He had noted that the framework of the sponge served as guides for the vessels to fresh connective tissue, and that at the end of a certain time the organism completely incorporated this exogenous tissue. Belt's experiment was renewed by Trousseau and by Valude. These operations were not successful; elimination took place in the first few days. Much more favorable were the attempts of Schmidt (1910) who made use of globes of bone sterilized by steam. There was no elimination and the stump kept its primitive dimensions. De Wecker, Kuhnt, also obtained favorable results with sterilized bone, and if this method has not become more universal, it is probably due to the difficulty of finding spheres cut to the necessary dimensions (fifteen to twenty millimeters in diameter) and ready for use.

In 1915, having had disappointments in attempting to graft living costal cartilage in Tenon's cavity, I had the idea of practicing on wounded soldiers inclusions of calf cartilage fixed in 20% formalin for a week, and then carefully washed. My intention was to proceed by two stages. First to make an inclusion of dead cartilage, preliminary operation, whose object was to avoid elimination of the living cartilage which is so sensitive to infection. I desired in this way to get over the dangerous period, and three months later to remove the temporary inclusion and graft in its place costal cartilage, which according to my idea was to form a permanent stump.

The insertions of formalinised cartilage were successful, but my astonishment was great on finding that after several trials the living transplant rapidly diminished in volume, whereas the first had not

varied. I therefore modified my mode of operation and systematically employed in all cases of extirpation inclusions of formalinised cartilage. In 1917 I presented to the Paris Ophthalmological Society, a number of patients operated since twelve months. In 1918, I presented some more, but I published no treatise on the subject, wishing to submit the process to the proof of time. To-day, after six years' practice, and an experience of sixty cases, I can speak with a full knowledge of the subject. In the meanwhile, researches on grafts have made clear certain obscure points. They have brought to light certain biologic conditions which it is indispensable to know.

TRANSPLANTS OF DEAD TISSUE.

For a very long time it was believed the only living tissues could be grafted, that is to say, once transplanted they were accepted by their host's organism, and that they continued to live on their own account. All that was known was that the chances of success were slight and that even under the most favorable conditions (autoplasty) there were for grafts without pedicle about 40% of failures. In the years following, the great war, a considerable number of prosthetic operations were attempted on the limbs, radiographic examinations were multiplied, experimental studies were carried out, and it was discovered that the vascular, osseous, tendinous or nervous grafts which appeared to be really living, in reality died a short time after their transplantation. But, and this is of capital importance, it was remarked that simultaneously their carcass served as a framework for a young tissue, the newly formed cells of which took the place of those of the transplant. This phenomenon occurs on condition that there be contact between the graft and the tissue of similar nature of the organism of the host.

Here is therefore a new conception of living grafts which revolutionizes our old ideas, and explains the bad results obtained by transplantation into the orbit of living cartilage. It is a sort of biologic law to which the only exceptions appear to be the cutaneous epithelium and the corneal epithelium.

But if all living tissue (nerve, bone, cartilage, tendon) dies, it must be remembered that its presence suffices to provoke the apparition of young cells of the same nature, and it comes to mind immediately that a transplantation of dead tissue ought to provoke the same phenomenon. Experiments have shown that this is so, and that nerves, tendon or bone killed by alcohol or formalin fulfilled quite as well and even better their rôle as framework for the new tissue. These facts explain Hamilton's remark, which we have previously mentioned, and enable us to understand how an aseptic sponge can be invaded by connective tissue. For the same reason we can no longer feel astonished at the good results obtained by Schmidt and by Kuhnt, in making use of bone to execute Mules' operation.

Professor Nageotte (Paris) has likewise shown (1920) how the tissues of the nose act differently with an inorganic transplant such as glass, gold, ebonite, etc., and with a transplant of organic tissue killed by histologic fixation.

A disc of glass, silver or of rubber inserted under the skin of a rabbit's ear causes no reaction of the tissue: it encysts and the membrane of this cyst is itself insignificant. If the pocket be opened, the foreign body will be found there in a state of liberty. The result is quite different if we insert, in the same place, a disc of bone or cartilage previously fixed in alcohol or formalin, that is to say, a disc of substance organized but deprived of life. Union almost immediately takes place by continuity of substance between the inserted piece and the connective tissue of the host. In the case of cartilage, this adherence takes place thru the perichondrium. In the case of dead bone an analogous phenomenon occurs. The natural surfaces adhere to connective substance of the host, but neither in the case of cartilage nor of bone do the surfaces of section join with it.

Independently of this union between dead and living tissue, a phenomenon which already differentiates entirely the

inclusions of organic or inorganic substance, there appears later a new factor of great interest. When the transplants are osseous or cartilaginous, there appear at the points of contact of the dead tissue osseous nodules or again cartilaginous nuclei produced by the connective tissue of the host. It follows that, at the end of a certain period, a fresh skeleton piece is formed which envelops the transplant. The latter enveloped in a living sheath will persist unless young living tissue substitutes itself for it progressively.

From these facts, we now know that when introduced into the organism, organized substances, even when they are deprived of cells and unable to be reinhabited, take up once more a rôle in the life of the tissues. We have at the same time the explanation, not only of the perfect toleration of dead cartilaginous or osseous fragments transplanted into the orbit, but also of their persistence without diminution in volume.

CARTILAGE FIXED IN FORMALIN.

I chose cartilage in preference to bone because it can be cut as easily as a potato. The sternal piece of large sized calves is, however, the sole material voluminous enough to allow the cutting out of fragments of twenty to twenty-five millimeters in thickness and of the length required. One should be very careful not to remove the perichondrium, as this membrane will be the point of union between the transplant and the tissues of the host. This fresh cartilage is fixed for eight to ten days in a solution of 20% formalin. The formalin is then decanted and replaced by sterilized water. This substance is ready for use two weeks later, when it has had time to disgorge the fixing product. This formalin will permeate the water, and in this weak antiseptic solution, the fragments will keep indefinitely, forming a reserve on which one can draw according to requirements.

The mode of operation I followed is very simple. After extirpation the fragment is inserted into the muscular funnel. It is necessary that hemostasis should be complete. The edges of the muscular plane are seized with small clips, the vertical traction of which keeps the pocket open. The fragment, which should be as large as possible, is then pushed into the bottom, and the pocket is very carefully sutured with catgut. Over this muscular layer, the conjunctiva must be closed with U shaped stitches so as to make sure that the edges meet perfectly. I terminate the operation by a temporary blepharorrhaphy which I relieve on the third day. This sealing of the eye lids is a precautionary measure in case of secondary hemorrhage, which would distend the pocket. Its effect is to prevent the chemosis which often results from the rubbing of the eyelashes on the conjunctiva.

The patient is then furnished with a binocular dressing for three days in order to immobilize the ocular muscles.

Since 1917 I have always followed this same technic, after having assured myself of its perfect efficacy.

I consider as essential:

1. The sutures of the muscles and of the conjunctiva in two planes with separate stitches.
2. Complete hemostasis.
3. The inclusion of a voluminous cartilage, from which the perichondrium must not have been scraped off.
4. A binocular dressing for three days.

All those who may try the implantation of formalinised cartilage by this method, will perceive the ease with which the organism accepts this dead tissue. Except in the case of panophthalmia or of orbital infection, recourse may be had to it, and I have had numerous successes after extirpation for laceration of the eyeball by projectiles of war. Elimination in the first days will take place only if there is infection, serious hematoma, and if the cartilage has been deprived of all its perichondrium. But if there is no elimination in the first fortnight, the transplant may be considered as permanent, for in my cases I have never had a tardy elimination.

Dead cartilage offers the great advantage over living cartilage of being able to furnish voluminous fragments.

Whatever its origin may be, it is nevertheless always made up of pieces rather long than thick. The cross section is at the two extremities, whereas the other faces are covered with the perichondrium. When inserting the transplant into the cavity, I proceed so that the sides covered with this connective sheath may be in contact with the rect. int. and ext. muscles, so that the adherence may take place principally with the muscles which control the horizontal movements.

MARSUPIALIZATION AND TRANSPLANTATION.

I have just spoken of the transplantation of formalized cartilages at the moment of extirpation. This operation is, however, still possible in cases of long standing extirpation, where the patients are not satisfied with their immovable stump. The only conditions required are: a clean conjunctival cavity and, behind, a small mobile cluster formed of retracted muscles. Briefly, extirpation must have been practiced in a proper manner.

The problem consists in creating in the midst of the fibromuscular mass at the bottom of the orbit a pocket (marsupialization), in the middle of which will be inserted the fragment of cartilage. This result is obtained by incising and then freeing the conjunctiva from its deep attachments.

The fibromuscular mass is then seized by its center, an opening is made in it and this is enlarged by means of a forceps. The edges are drawn forward and the cartilaginous transplant is pushed in. The muscles are then sutured with catgut, the conjunctiva with silk, and we terminate by a blepharorrhaphy as in an ordinary operation.

In December, 1921, I presented to the Ophthalmological Society of Paris an officer who had been obliged to undergo the operation of extirpation during the war. Two years later, immediately after the armistice, he came to see me, complained of his immovable stump, and asked me to remedy it. He was operated in February, 1919. The consequences of the operation were very simple, and since three years he has been wearing a movable stump which has not diminished in volume. The transplant, which is very large, raises the eyelid well, and avoids that ugly fold which cannot be prevented in ordinary enucleation.

CONCLUSION.

The superiority of inclusions of dead organic tissues to living tissues is established by clinical practice. When the inclusions are assimilated by the organism, they do not diminish in volume. The fundamental difference between inclusions of inert unorganized tissues, such as glass or gold, and dead organic tissues, such as bone or cartilage, lies in the fact the former are foreign bodies tolerated and encysted, whereas the latter are adopted and young osseous cells are seen to appear in them. The former may be expelled one day, whereas the latter, once admitted, are permanent.

These inclusions may be made at the same time as the extirpation, but they can also be effected on extirpations of long standing, provided that this extirpation has been properly made. It is in this case necessary to create a pocket in the middle of what remains of the muscles, but the results obtained are often excellent and comparable to the best stumps consecutive to amputation of the anterior segment.

Bibliography of 31 references.

Peritomy for Chronic Vascular Ulcers of the Cornea.

Dr. Antonio F. Alonso, Mexico City. The systematic treatises on ophthalmology commonly recommend peritomy for the cure of pannus arising from trachoma. Duane has suggested it for episcleritis, corneal herpes and rosacea keratitis. Verhœff suggests it for neuropathic conditions. Terson regards it as a valuable remedy in vascularization of the cornea including certain ulcers. There is a group of chronic vascular ulcers of the cornea, extremely rebellious to ordinary treatment, for which peritomy proves very effective. The ulceration seems to be kept up by persistent, tortuous,

superficial vessels that seem not to be susceptible to the influence of adrenalin. These ulcers are situated near the center of the cornea at the termination of the visible vessels, are sometimes discovered only by a magnifying lens and frequently accompanied by corneal scars. They usually do not stain well with fluorescein. Other methods of treatment are useless and they yield promptly to peritomy. Three cases are reported. The first in a scrofulous woman of 30 years, with vision reduced to 1/3, presented two ulcers and vessels hardly visible. She was under treatment 9 months without improvement, but peritomy at the upper margin of the cornea done with a galvanocautery gave complete cure in 15 days.

The second patient, a boy of 12, had suffered from keratoconjunctivitis for several years. The ulcers had been treated by many oculists without good result. Peritomy was practiced at the lower nasal margin of the cornea, and in 10 days the ulcers were absolutely healed.

The third patient, a woman of 50, had received tuberculin treatment for lupus without result as regards a central ulcer of the cornea, to which two or three slender tortuous vessels made their way from above. She had been under treatment one and one-half years. Peritomy by cauterization produced improvement within three days and complete healing in 20 days, with vision of 1/10. Every such patient should have the cornea examined with a lens to discover the vessels which maintain the lesions. The frequency of these ulcerations, their resistance to ordinary treatment and unfavorable effect on vision demand that systematic writers and teachers of ophthalmology give them more attention.

Types of Pneumococcus Found in Corneal Ulcers.

Dr. Robert Cartwright Cheney, Boston, Mass. In 1902 Römer, realizing the inadequacy of the treatment of pneumococcus ulcer of the cornea and the disastrous end result as far as useful vision was concerned, attempted serum treatment in these cases. Using small doses of immunized animal serum, he had promising results in rabbits. In men, however, the results were by no means as striking, and in the five cases treated only three were apparently successful. These three patients were only 43, 31, and 16 years of age, and hence had a much better chance of recovery under any treatment. The serum treatment has never proved of any clinical value and has never supplanted cauterization or other previously recognized forms of therapy.

In recent years the value of serum treatment in cases of lobar pneumonia has apparently been proved and a very satisfactory summary is given in a monograph from the Rockefeller Institute by Avery, Chickering, Cole, and Dochez. It was found that pneumococci might be divided into IV types on the basis of their specific immunity reactions. To quote directly, "pneumococci of types of I, II, and III, compose about 80 per cent of all strains encountered in disease, and represent three apparently fixed types of highly parasitic organisms, each possessing common immunologic characters." Type III is the pneumococcus mucosus. Type IV pneumococcus is a heterogeneous group, and is mostly made up of individual strains which are not interrelated and do not have a common agglutination reaction with any single immune serum. In short, it is possible to obtain three stock sera. Types I, II, and III have specific agglutination reactions for the corresponding types of pneumococci; but as is evident from the preceding statement, there is no type IV serum, and a pneumococcus which does not agglutinate any of the three sera is relegated to the type IV group. In the actual clinical application of the sera, the type I serum in large intravenous doses is seemingly highly effective in lobar pneumonia caused by a type I organism, but of no use in a case caused by a pneumococcus of another type. Type II and III sera as yet have not been proved to be of clinical value.

In view of the above facts it seemed important to ascertain the types of pneumococcus found in corneal ulcers, with the hope of finding an ulcer caused by a type I organism which might advantageously be treated with serum.

Some difficulty was encountered at first in obtaining a satisfactory culture medium, as naturally comparatively little material for inoculation is obtainable from a corneal ulcer. Intraperitoneal injection in white mice was not satisfactory, but Avery medium proved to be just what was needed, and I never failed to get a growth from a pneumococcus ulcer when this medium was employed. It was described by Avery in 1918, and is a meat infusion broth three-tenths to five-tenths acid to phenophthalein. To each 100 c.c. of broth is added 5 c.c. of 20% sterile glucose solution and 5 c.c. sterile defibrinated blood.

The following was the method of procedure: The eye was carefully cocainized, a speculum inserted, and as much material as possible obtained by curetting the advancing infiltrated edge of the ulcer, which was found to be the only place where pneumococci were plentiful enough to give a satisfactory culture. Great care should be taken not to traumatize the normal corneal tissue, and the ulcer should be cauterized immediately after curetting, as curetting alone tends to make the process somewhat worse. Next, a tube of Avery medium was inoculated with the material so obtained and, after careful shaking, was placed in the incubator for six to ten hours, at the end of which time the blood corpuscles had settled at the bottom of the test tube. The supernatant fluid was almost always found to contain a pure growth of pneumococci. From this the type was ascertained by direct microscopic agglutination with the sera obtained from the New York State Board of Health, and the solubility of the organisms in bile determined (pneumococci soluble in bile, streptococci not). Römer called attention to the usual occurrence of a pure growth in pneumococcus ulcer of the cornea, obtaining 18 pure cultures in 20 cases. Thus no centrifuging was necessary, and the culture was directly grouped, the reaction being a combination of agglutination and precipitation. Care should be taken, however, not to allow cultures to go over 10 to 12 hours as the organisms in Avery medium form acid which soon kills them.

During a period of over a year, at the Massachusetts Charitable Eye and Ear Infirmary, cultures were obtained from 12 cases of pneumococcus ulcer of the cornea. These were pure cultures with but one exception, where there was a slight growth of staphylococcus. In eight of these cases the organism was type IV pneumococcus, while in the other four cases it was type III pneumococcus. No type I or type II organisms were found, the percentage being 66.6% type IV, and 33.3% type III.

Of the 12 corneal ulcers studied by me, 11 were clinically typical serpent ulcers, but one case needs special description: A boy 13 years old with a severe membranous conjunctivitis and a very superficial corneal ulceration which was secondary to the conjunctivitis. Type III pneumococcus was isolated from the conjunctiva. This eye recovered quickly with no impairment of vision.

In lobar pneumonia, type III pneumococcus is by far the most virulent, carrying a 45% mortality, so naturally there arises the question of prognosis in eye infections as determined by the type of pneumococcus. In this extremely small series with various methods of treatment, etc., no definite evidence is obtainable, but it does seem significant, that in the 11 cases of serpent ulcer, the only two eyes that required enucleation during the patient's stay in the hospital were infected with a type III organism.

The failure of serum in pneumococcus ulcers of the cornea is adequately explained by the fact that none of the organisms are of type I. The present pneumococcus sera obtainable have little, if any, specific action on organisms in the cornea and absolutely no benefit is to be expected from their use. That the type IV pneumoccoci found

in the cornea belong to one definite subgroup for which there may be a specific serum, is possible but not probable.

Passage of Water and Ions Thru Cornea.

Dr. Victor Morax, Paris. In the absence of Prof. Morax, his paper was briefly presented. The subject is one that interests the ophthalmologist, because on it rests the most important part of his local therapeutics; the absorption of drugs like atropin or pilocarpin passing thru the cornea into the anterior chamber and so reaching the iris tissue. The effects of such passage are well known, the mechanism producing it is ignored. It has been studied only from the chemical point of view. It should be taken up with regard to the new conceptions of the osmotic tension of solutions and the ionic constitution of salts.

Studies of this kind were undertaken in collaboration with Girard and Mestrézat, of which certain results interest the oculist and physiologist, especially the modifications that can be produced in the volume and chemical constitution of the aqueous. The latter depends on the permeability of the cornea to the substances which bathe its external epithelium.

To change the volume of aqueous, electric osmosis has been practiced on the living eye, in the living animal. One pole is plunged into the solution of the electrolyte in which the cornea is bathed. When this is a solution of magnesium sulphat, endosmosis in the eye of the rabbit will raise the tension of the globe, from about 25 to 50, or even to 70 mm. of mercury. On the other hand, with the same polar attachments, using a solution of calcium nitrat, exosmosis may reduce the tension of the eyeball to 8 or 10 mm. of mercury. This can be accomplished without causing any lesion of the cornea, not even edema, by using a current of not over 2 milliamperes. In eyes with normal circulation and no obstruction to drainage, such changes of tension pass away in about an hour. These changes have been made in the eye of the rabbit, but not yet in the human eye.

There seem to be great therapeutic possibilities in the modification of the ionic constitution of the aqueous, by diffusion of substances thru the cornea. This may be effected thru the influence of the electric field, or by simple diffusion. By the collaboration of Girard and Mestrézat, using the methods of microchemistry, it has been demonstrated that when the anterior surface of the cornea has been kept bathed with the solution of a certain salt, it is not the salt as such that diffuses thru the cornea; but the two ions that compose it which diffuse, not in their chemically equivalent proportions.

For example, solution of magnesium sulphat bathing the front of the cornea does not reach the aqueous, as sulphat of magnesia—an equal number of anions and kations; but many more magnesium ions will diffuse than those of the sulphuric acid, and this will lead to the displacement probably of a number of sodium ions equal to the excess of magnesium. With some of the monivalent salts of ammonium this inequality is very great; the anions (acid radicals) diffuse in such excess that there exists practically a true ionic hemipermeability of the cornea. This elective permeability of the cornea can be used to make the aqueous more alkaline or to render it slightly acid. It can occupy a most important place in ocular therapeutics.

(*To be continued*)

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SYMPATHETIC OPHTHALMIA.

When the neurosis called sympathetic irritation and the obscure cases in which the retention of a badly damaged degenerated eye is suspected of causing amblyopia of its fellow have been excluded, we have in sympathetic ophthalmitis, or true sympathetic inflammation, a well differentiated type of disease; and one that in many respects must be classed by itself. Sympathetic ophthalmia presents difficult problems, the solution of which will throw light on the pathology of many other diseases; while the fact that it is likely to destroy the sight of the patient's useful eye gives the strongest incentive for us to understand and master it.

The features of the condition that challenge our attention and investigation are: 1. It is always secondary to pathologic changes in the eye usually starting with trauma. 2. A period elapses after the injury, or gross disease of the one—the exciting eye, before sympathetic ophthalmia attacks the other. 3. Certain histologic changes occur in the exciting eye before the sympathizing eye is affected, and then quite similar changes occur in it. 4. The pathologic changes include the development of what closely resemble infective granulomata, especially those of tuberculosis and sporotrichosis. 5. The disease shows a strong tendency to improve and then relapse, with gradual increase in the pathologic changes until useful vision is destroyed. 6. Removal of the eye primarily injured or diseased prevents the disease of the eye; except in a few cases in which sympathetic disease has appeared in the other eye shortly after such removal. 7. Prompt removal of the exciting eye after the appearance of sympathetic ophthalmitis greatly improves the prognosis of the case. 8. Vigorous treatment with salicylates and mercury has some value in controlling the disease. 9. The uveal tract is always involved in the lesions, but all the tissues in the eye are likely to be affected. 10. Eyes affected with this disease show little or no tendency to caseation of the products of inflammation, but a rather marked tendency to ossification.

Ever since it was recognized as a distinct pathologic condition, sympathetic ophthalmia has been an attractive subject on which to theorize. As channels of transmission, the optic nerves and chiasm, the nerve sheaths, the branches of the trigeminus, the sympathetic nerves, the blood channels of the orbit and the general blood stream have all been invoked. To account for its tendencies, nerve influences, bacterial invasion, bacterial toxins, cytotoxins, anaphylaxis and focal infections have all been suggested. The possible bearing of each new observation in pathology has been speculated upon; one of the latest being the comparative rarity of the disease under the surgical methods applied during the late world war. It is evident that essential facts are still lacking from our knowledge, which additional close observation alone can supply.

Meanwhile we have learned, empirically, some things that can be done to lessen the number of cases of blindness produced by sympathetic ophthalmia, as: Early enucleation of eyes blind after trauma, particularly in children; careful antisepsis in the treatment of wounds; the free use of salicylates in plastic inflammations following trauma, and the prolonged use of mercury; care to secure and maintain the highest plane of general health in the patient; a long period of complete absence of inflammatory symptoms, before operative interference with an eye damaged by this disease. Without neglecting any of these points, we can turn hopefully for new light to the test proposed thru pigment sensitivity, and what other new suggestions are based on careful observation and reasoning in the clinic and laboratory. E. J.

INDUSTRIAL BLINDNESS.

Absolute blindness is rare and of only scientific and academic importance. Practical, economic, or industrial blindness—the reduction of vision to the point where it ceases to be a practical guide and assistance in labor and recreation—is much more frequent and raises all the legal, educational, economic and social welfare problems that grow out of blindness.

In adopting a declaration of what should be considered industrial blindness, the Section on Ophthalmology of the American Medical Association took an important step toward placing on a definite basis the estimation of damages and of proper compensation for industrial injuries to vision. It also established a standard that should be considered and adopted in laws providing pensions or other relief for the blind and the administration of such laws; and for the admission of applicants to schools, homes and other public institutions for the blind.

There has been great confusion and disagreement as to what constituted practical blindness. It is a matter of common observation that one person accomplishes a great deal more than another with the same visual acuity and power, as measured by scientific tests. Nevertheless, standards must be established in order that justice may be done between man and man; and that the individual possessed of superior energy or industry may secure the proper reward of the greater effort he puts forth.

The divergence of views as to how visual disability should be estimated was apparent in the discussion that took place in the section, before action was taken on the reports from the committee that has been studying the subject. There were majority and minority reports. But with reference to the standard for industrial blindness, the committee was unanimously agreed; and no serious objection was raised in the discussion to the standard suggested, that the eye or the person with less than one-tenth vision, say 20/220, should be regarded as industrially blind.

This subject has long claimed the attention of ophthalmologists, and the committee above referred to had considered it for several years before offer-

ing a tentative report last year, which was referred to local ophthalmologic societies for their consideration and discussion. After such prolonged study and consideration, the unanimous adoption of this standard should be regarded as giving us a fixed basis for laws, rulings and practice with regard to the blind and their care, and the fixing of economic relief.

If ophthalmologists and their societies will at once adopt and advocate the acceptance of this standard, it will help to bring order out of confusion, and promote uniformity of practice and statistics that has been sadly lacking. In one state the sentimentalists charged with the administration of a blind pension law have ruled that vision of less than five-tenths should be considered "blindness," entitling the applicant to a pension. It is not surprising to find under this administration, the principal city of this state is paying as much for blind pensions as a city ten times as large working under an essentially similar law in another state, but with a more reasonable standard for industrial blindness.

The problems that have to be worked out and dealt with in regard to partial destruction of the visual function are numerous and complicated. But very little progress toward their solution or intelligent discussion was possible, until some standard of what should be regarded as industrial or economic blindness was agreed upon. Starting from this point, it becomes practical to consider how loss of vision in one eye, loss of binocular vision and loss of part of the visual field should be regarded. Then should a certain impairment of visual ability be similarly regarded in every citizen; or should occupation, age, previous earning power, etc., be considered in awarding compensation. With 48 different state legislatures to deal with these questions, there is prospect of confusion in laws and practices for a long time. There is still great need for intelligent enlightened leadership in regard to these matters on the part of ophthalmologists. E. J.

BOOK NOTICES.

Wilbrand, H. and Saenger, A. Die Neurologie des Auges, IX Band. Die Stoerungen der Akkommodation und der Pupillen; und Gesamt-Register zu den Baenden, I-IX. Pages 320 and 154, 17 illustrations. Munich and Wiesbaden. J. F. Bergmann. 1922.

This volume completes a monumental work. The enormous and swiftly growing literature of ophthalmology becomes really available for the information of the practising ophthalmologist, only as it is carefully worked over, condensed and arranged in monographs; by students who are content to devote to this work of digesting the existing literature, energy that would probably bring greater rewards in the fields of original research or private practice.

Wilbrand and Saenger, in their collaboration to render serviceable the great literature of the relations of the eye to the nervous system, have won a right to the respect and gratitude of all students of ophthalmology of the present and future. Their work of selection, condensation and arrangement has been well done. It reaches a climax in the subject index of 154 double column pages, which renders directly accessible practically everything in the world's literature relating to the neurology of the eyes. Lists of authors names and complete bibliographies of all included subjects are supplied in each volume. The bibliography referring to the accommodation and pupil includes 1080 references, and is as near accurate and complete as seems humanly possible.

The consideration of the accommodation of the eye and its disturbances occupies but 25 pages, probably in recognition of the fairly complete representation of the literature relating to it in chapters and monographs upon the refraction of the eye. Brief notice is accorded to its relations to anatomy and its physiology, its range, its relation to convergence, its influence on the apparent size of objects, etc. Then 9 pages are devoted to paralysis of ac-

commodation, and 5 to spasm. In this brief chapter there are over 100 references to papers and monographs, and with most of them brief condensations into a few lines of the important points of case reports or long papers.

The chapter on disturbances of the pupils opens with an account of the anatomy and movements of the musculature of the iris. The processes that produce a narrowing of the pupil are reviewed, the light reflex, the physiology of the pupillary movements and the narrowing of the pupil with accommodation and convergence. Next the processes which produce widening of the pupil are taken up, the reflex to irritants, the psychic and brain reflexes, vestibular, voluntary dilatation of the pupil, etc. After that the ciliospinal center and the part of the cervical sympathetic are considered; and the paradoxic, myotonic, neurotonic and vagotonic reactions are noticed.

The absence of the light reaction of the pupil is spoken of as reflex pupillary rigidity, and is accorded 66 pages. It is probably better to give this condition a name based on its essential character, and not to designate it as the pupil or phenomenon of Argyll Robertson. But it seems strange that the name of this worker who brought the phenomenon to the attention of ophthalmologists in 1869 is given the barest incidental mention in connection with it; and in the bibliography no reference is given to volume XV of the Edinburgh Medical Journal in which was published his paper on "Four Cases of Miosis in Spinal Disease," or to any other of his writings. This omission illustrates the impossibility of a perfect bibliography. The fact remains, that those of Wilbrand and Saenger are as near complete as have ever been compiled, with regard to such extensive and widely scattered literature.

The discussion of this subject of pathologic absence of the light reaction is complete and systematic. Its development, diagnosis and relations are followed by discussions of theories for it. Its occurrence in tabes and paralysis, its etiology, both syphilitic and non-syphilitic, and its course, are all shown in the light of recorded cases. The unilateral occurrence of the symptom is noticed. The following list of non-syphilitic causes will surprise some who have regarded this symptom as conclusive evidence of syphilis: Brain tumor, meningitis, trauma, apoplexy, polioencephalitis, epidemic encephalitis, Friedrich's disease, mental disease, alcoholism, nicotin poisoning and diabetes, all cause it.

Absolute and katatonic pupillary immobility are considered. Then, under the heading of abnormal width or narrowness of the pupil, all forms of mydriasis, miosis, anisocoria, "springing" mydriasis, the shape of the pupil, spasm of the sphincter and spasm of the dilatator are discussed. The body of the book concludes wih a 30 page general review of what is known of the behavior of the pupil under normal and pathologic conditions, in congenital anomalies, and the effects of disease on the nerve tracts.

For ophthalmologists and neurologists who wish to have at command the literature of this subject, this work of nine volumes, some 5630 pages, with hundreds of illustrations and thousands of references, is invaluable. The whole medical profession and the people they serve are indebted to Wilbrand and Saenger for the careful conscientious work they have done on it. Prof. Saenger's career is already closed, and a short biographic note from his colleague opens this volume. From Prof. Wilbrand, whose energies are now released from his selfappointed task of more than 25 years, we will still hope for contributions to our literature, enriched by the results of these completed labors. E. J.

Ophthalmological Society of Egypt. Bulletin of 1921, 80 pages, 8 plates, 6 in colors. Edited by the Hon. Secretary, Cairo, 1921.

This society, which was established in 1902, is now affiliated with the Ophthalmological Society of the United Kingdom, but continues to publish its annual bulletin of transactions. The title of the volume is printed in Ara-

bic, French and English, but of the 12 papers, 11 are published in English and 1 in French. In addition to these scientific papers, there is a committee report of 14 pages on "The Means of Prophylaxis against Trachoma and Ophthalmia;" the constitution and rules of the Society, the list of its members, 78 active, 12 honorary; the report of the annual meeting which is held the last of February or beginning of March; a list of abbreviations used, substantially the same as that of the Ophthalmological Society of the United Kingdom; and instructions for sending specimens for examination. All these are in English. On the back of the title page is printed the notice, that microscopic examination of tumors will be made free of charge for members of the Society, if the instructions for sending them are carried out.

One of the papers illustrated by plates is upon the sclerocorneal junction, its clinical description, its importance in slight forms of trachoma and its anatomic topography as regards intraocular operations. The other illustrated paper is upon retinal hemorrhage after nonperforating injury of the globe, reporting two cases. Other important papers are on an epidemic of cases of purulent ophthalmia complicated by herpetiform eruptions, 3 cases of streptothrix infection of the conjunctiva, a case of ptosis cured by Motais' operation, a case of arteriovenous aneurism of the orbit, an account of Curran's iridotomy for glaucoma, and a paper on milk injections and their therapeutic value in various diseases of the eye.

This pamphlet reflects scientific activities extremely creditable to a society of less than 100 members, meeting but once a year, and not supported by a highly organized general profession and established educational institutions, such as exist on Western Europe and America. It must be a source of satisfaction to those leaders in ophthalmology whose examples have brought about the existence of this organization and stimulated its scientific work. E. J.

CORRESPONDENCE.

"Wrestler's Trachoma."

To the Editor: In as much as my observations are made the left handed introduction for Dr. Patton's communication, under the above caption, in your July issue; and his findings are not only so positive, but so positively in variance with mine, it seems appropriate that I should draw renewed attention to the essential points of difference in our respective observations.

In the first place, I considered only the cases with which I had been in touch for 20 years or more, where the picture of trachoma was complete, (trachoma bodies, intervening scar tissue, and corneal irregularities); so that there could be no question about the diagnosis. Dr. Patton can have no such sure ground in cases of 10 days (or 10 weeks) duration. He may be willing to let his reputation stand or fall by a positive dictum in the primary inflammation, but until the status of conjunctivitis presenting swollen follicles has definite placement, I must reserve my decision. And a prompt cure with astringents and expression appears to me as really the opposite of conclusive for the diagnosis.

Again; my patients were not professional wrestlers—just husbands, wives, parents and children; and while I have never heard of any "rough house" among them, I can hardly imagine such a freedom from minor accidents and grief as to preclude the possibility of motherly eye wipings, and not always with sterile hands. (N. B. I am still awaiting a better explanation for the complete subsidence of trachoma in the 6 families whose histories I recorded, where, on the interhuman contact theory, it should have been widely disseminated.)

Finally: In my suggestion that an intermediary host might better explain the spread of trachoma, I find that I am not alone. From a study of emigrants freshly landed, and many years experience with trachoma as exhibited in the Massachusetts Eye and Ear Infirmary, Dr. Myles Standish has reached conclusions similar to, tho not

identical with, mine. A letter from him to this effect is enclosed; and I feel that I violate no confidence in allowing you to quote from it, by way of postscript, as freely as you see fit. In the event that one or the other of our intermediary host deductions should bring order out of the present confusion, any skepticism about contagion would be justified. In the mean time it might be well to have wrestlers' sleeping quarters inspected for both kinds of carriers. Sincerely,

H. B. YOUNG.

Burlington, Ia.

Transmission of Trachoma.

Dear Doctor Young: I have just been reading your article in the last Transactions of the Academy of Ophthalmology and was much interested in it.

Trachoma is certainly contagious in the sense that it is definitely known that it will spread among the inmates of soldiers' barracks, orphan asylums, prisons, etc., but how?

I have been most of my professional life connected with the Massachusetts Charitable Eye and Ear Infirmary, and for at least 20 years of that time it was our custom to take trachoma patients into our wards with no more than ordinary precautions against infection, and during all that period I never saw but one case in which there was a suspicion that the trachoma had arisen in the hospital.

Living in Boston, where large numbers of foreign emigrants are dumped down yearly, it has been my fortune to see a great many persons who affirmed that they had contracted the disease aboard ship. Many of these I knew from the stage of the disease were just plain liars. Nevertheless, I have seen a large number of acute cases in patients who had been in the country only two or three weeks, and who would have never gotten by the immigration officers if their eyes, at the time they landed, had been in the condition they were when I first saw them.

I have been forced to accept the fact that they probably did acquire the disease aboard the ship. I have deduced from these facts the theory that you have tentatively advanced, that the disease requires an intermediate insect host, and have frequently said that the above facts pointed most strongly to the bed-bug as the insect that disseminated the disease.

Such a theory would be equally applicable to your cases, for the rise in social status and cleanliness would limit the extension of the disease in these families.

Thinking you might be interested in my point of view, as I came to a parallel conclusion with yourself, from the observation of an entirely different group of cases, I am writing this.

Very truly yours,

MYLES STANDISH.

We asked Dr. Standish for permission to publish the above letter, and he added the following comments. (Ed.)

When, some years ago, trachoma was much more common in New England, we had at the Infirmary every spring a group of trachoma cases among loggers, who spent the winter in lumber camps in the woods. The wooden camps in which they had lived thru the winter were, of course, ideal habitats for bedbugs.

I once read in some ophthalmic literature an account of a military barracks, in Spain if I remember correctly, which was abandoned on account of the amount of trachoma among the soldiers. It was closed for a year or two, and then a battalion was placed therein, with the result that a large percentage of the new troops promptly developed trachoma. I do not know how long a bed-bug lives, but they have been known to live a year sealed up in a bottle in a laboratory.

I asked a Public Health Service physician who had worked among the Kentucky mountaineers in the campaign against trachoma whether the bed-bug was common in the homes of the sufferers from the disease. He replied: "They are very common, in fact, you might say they were present in the houses of every case of trachoma in that district."

Modern hygiene has greatly improved the conditions of public institutions during the last decade or two, and altho the institutions are just as crowded as ever, epidemics of trachoma in institutions are practically unknown at the present time.

I have had under my care single cases of trachoma in well-to-do cleanly families, when the disease persisted for a year or more in the affected person, yet no other contracted the disease. That this was due to care may have been the case, but when we consider how acute conjunctival and other infections which are conveyed by discharges from the eyes and nose spread in similar families, in spite of all precautions, I am not inclined to accept that explanation.

Very truly yours,
(Signed) MYLES STANDISH.

"Perimeter of Variable Radius."

To the Editor: In looking over the March number of Oph. Lit. for something else, I have just come across the description of Vincentiis' Perimeter of Variable Radius, a publication which clearly gives him priority over myself as regards the principles of the perimeter, description of which I sent you some little time ago.

Very truly yours,
EDWARD J. BROWN.
Minneapolis, Minn.

ABSTRACTS

Procksch, M. Bilateral Keratitis and Iridocyclitis with Multiform Exudative Erythema. Wien. med. Woch., 1921, p. 1076.

In the course of a multiform exudative erythema, a bilateral catarrhal conjunctivitis occurred. Two weeks after the skin eruption, a bilateral keratitis of peculiar appearance was noticed: a ring of one to more rows of small round interstitial infiltrations of the cornea. Five days later a bilateral fibrinous superficial iritis with precipitates and pigmented synechiae set in. These conditions continued for a week, then gradually grew better, and five weeks after the onset of the exanthema the eye symptoms had disappeared with the exception of slight corneal infiltrations and residues of the precipitates. Characteristic were the acute onset, the relatively serious symptoms and the benign course. H. A.

Vogt, A. and Knuesel, O. Remote Damage to Retina by Trauma of Skull. Klin. M. f. Augenh., 1921, v. 67, p. 513.

The authors report in detail, 3 cases of retinal changes, originally described by Purtscher, after a fall upon the head, in 2 unilateral, in 1 bilateral. A fracture of the skull could not be proved, and there was no loss of consciousness. The changes consisted in white foci in the anterior layers, round, from 1/4 to 1 disc size, exclusively in the papillo-macular region spattered hemorrhages. Central and peripheral visual disturbances, immediately and soon after the accidents. The white foci and hemorrhages healed in the course of months, followed by slight temporal pallor of the disc and long remaining crescentic scotomas.

The observations yielded some new points by means of more exact methods of examination, which seem to support Purtscher's explanation. The location of the white foci, protruding the limitans interna like clouds, in the layer of nerve fibers is proved by the fact that they partly cover the large vessels or partly lie immediately under them. Sometimes they are sharply cut off by a vessel, which acts as a barrier to their spreading. The white glistening crystals, as remnants of absorption, indicate that retinal substance has been destroyed within the white foci, and probably consist of cholesterin. They represent the anatomic basis of the vessel disturbances and the temporal pallor of the disc. The changes were most pronounced soon after the trauma. This is the expression of forcing of lymph between the tissues of the retina, by a sudden violent increase of intracranial pressure; while choked disc is produced by a chronic increase of pressure.

With Gullstrand's binocular ophthalmoscope, a lucid edema of the retina was ascertained. In the stage of absorption the streaky hemorrhages appeared as the nuclei of the white foci. They are also due to stasis, as further proven by the abnormal congestion of the chief veins. Hence the white foci and hemorrhages are the consequences of the same cause, viz., the increase of intracranial pressure, the hemorrhages contributing to the rupture of the lymphatic sheaths. The affection is entirely distinguished from the opacity of Berlin, which is diffuse and transient, and is caused by contusion of the eyeball, not the head. C. Z.

Feigenbaum, A. Tarsectomy in Trachoma and Trichiasis. Klin. M. f. Augenh., 1921, v. 67, p. 600.

From his experience with tarsectomy, according to Kuhnt, in many hundreds of cases in Palestine, Feigenbaum recommends it in all cases that require protection and reparation of the endangered cornea. His technic, a modification of Kuhnt's is described in detail. The dressing and sutures are left only for 24 hours. The after treatment consists in nitrat of silver for a few days and 20% solution of sulfat of copper. With this method he obtained complete cures of very severe cases of trachoma in from 1 1/2 to 3 months. The most striking was the considerable absorption of the pannus corneal opacity, and the amelioration of vision and correction of malposition of the lids, especially trichiasis. C. Z.

Schall, E. Extensive Tuberculosis of Anterior Segment of Eye and Lens. Klin. M. f. Augenh., 1921, v. 67, p. 584.

A boy, aged 10, had in the summer of 1919 an inflammation of his right eye, which 3 weeks before his admission in February 1920 ended in blindness. Ciliary injection, iris atrophic, permeated by large blood vessels, in the lower portion 3 yellowish papules, posterior synechiae, complicated cataract. Tubercular habitus, glands of neck, von Pirquet positive. Secondary glaucoma set in with yellowish exudate in anterior chamber, which increased, development of new nodules in the iris, infiltrations of the cornea. On account of irritation of the left eye, enucleation.

The anterior chamber was filled with tuberculous granulation tissue, covering the pupil, and extending to the iris and ciliary body, which was transformed into a large solitary tubercle. The granulation tissue invaded the cornea and the lens. In the adjoining retina were a few recent tubercles, the choroid intact. The cornea showed diffuse recent inflammation, an exacerbation of the chronic tuberculous process in the iris and ciliary body, but the large number of leucocytes in these indicated also here a combination of acute inflammation with the chronic. C. Z.

Behr, C. Anatomy of Senile Degeneration of Macula. Klin M. f. Augenh., 1921, v. 67, p. 551.

Behr gives the histologic description of a case of senile degeneration of the macula of a man, aged 78, who for some time complained of impairment of sight. Macroscopically a small dark spot was seen at the center of the macula, otherwise no changes. The affection consisted in exclusively degenerative processes without traces of inflammatory or reactive changes, most marked in the foveola and decreasing toward its margins. The degeneration progresses from outside, commencing at the outer membranes which disappear, to the inner membrane and the outer granules, and second from the foveola as a center toward the periphery of the macula. Essential changes of the choroid and ascending degeneration in the optic nerve were missed. At the inception, the simple primary degeneration is limited to the neuroepithelia of the foveola and fovea.

The senile degeneration of the macula, is like the congenital, infantile, juvenile, virile, and presenile forms, only an especial type of the general clinical aspect of macular heredodegeneration. The cause of the changes lies, not in external nocuous influences, but in the genetic units in the parental germ plasm. It is a hereditary premature death of the maculoretinal neuron. The anamnesis in this case did not seem to exclude the possibility

that in 3, at least in 2, successive generations a senile degeneration of the macula occurred. In order to diminish the deleterious action of the light thru filtration of the short waved rays, Behr gave two such patients euphos glasses, which exerted a beneficial influence and were enjoyed by them.

C. Z.

Clegg, J. Gray. Central Scotoma in Anterior Uveitis. Brit. J. Ophth., v. VI, No. 3, 1922, p. 118.

The author records some personal observations on the occurrence of a definite central or paracentral scotoma in cases not due to any ophthalmoscopic diseased state at the posterior pole. The scotoma may be relative or absolute, evanescent or permanent. The author's present view is that the scotoma is due to toxic influence on the retinal elements at the macula and secondarily on the papillo-macular band of nerve fibres. It is well known that certain toxic substances can produce scotoma. It is the author's opinion, that all forms of inflammation, other than directly traumatic, affecting the uveal tract are due either to bacteria or their toxins, and it would not be surprising if the same toxin were to damage the retina or the papillo-macular bundle. No doubt in a proportion of cases where the visual acuity has been considerably lowered without obvious reasons apparent in the media, a central scotoma will be found if it occurred to the observer to examine for it. Four case histories and five field charts accompany the contribution. The first case had a severe iridocyclitis in which the right eye was lost, the left eye showed a central scotoma. There was also present posterior ethmoidal and sphenoidal sinus involvement. Cases two and three were smokers, the latter was luetic, no fundal lesions. Case two showed a paracentral absolute scotoma. Case three, a central scotoma for color which later became absolute. Case four, iridocyclitis. no fundal lesion, left eye showed a large sector-shaped scotoma extending above fixation, the right showed a small central scotoma for color. D. F. H.

Fromaget, C. and H. Congenital Varicocele of Orbit. Ann. d'Ocul., 1921, v. 158, p. 116-120.

The patient presented a slight right exophthalmus, which could be partially reduced by pressure. However, by voluntary effort, she could produce an exophthalmus of 8 to 10 mm., without any deviation. This was accomplished by holding her breath and increasing the intrathoracic tension, which caused an interference with the return venous circulation. However, pressure on the internal jugular nerve produced no exophthalmus, but it occurred when the head was lowered so that the veins of the head became overfilled.

The authors consider the condition to be one of an orbital varicocele, where there was an abnormal venous network lying in the muscular cone and pressing the eye forward at all times. This was increased whenever this plexus became distended.

C. L.

Bollack, J. and Hartmann, E. Tumor of Hypophyseal Region with Lateral Homonymous Hemianopsia. Ann., d'Ocul., 1921, v. 158, p. 105-116.

Female, age 36, complaining of visual troubles 7 months, but with a history of cessation of menses and increased headaches on the right side, with exacerbations at night, which became more frequent and severe, and were accompanied by vomiting. Ocular examination showed paresis of the right oculomotor, increase in size of right pupil, right disc injected, blurred and slightly projecting. V=5/7.5. Field of vision showed a left homonymous hemianopsia, with preservation of central vision. Among other symptoms found, there was a distinct enlargement anteroposteriorly of the sella turcica, with destruction of the posterior clinoid processes. The patient died in less than 3 weeks, and the postmortem showed a large cystic tumor of the hypophysis, with more or less destruction of the right motor oculi and right optic tract. The various features of the case are discussed at length, and there are illustrations of the position of the tumor. C. L.

Bollack. Postencephalitic Paralysis of Associated Ocular Movements. Soc. de Neur., Jan. 12, 1922. Abst. Gaz. des Hôp. 1922, v. 95, p. 106.

A child of 11 years, following general transitory symptoms of an encephalitic type, has presented for four months the single symptom of a complete paralysis of elevation, divergence and convergence of the eyes, and of movement toward the left. The accommodation is unaffected, tho the contraction of the pupil is abolished on looking straight ahead. C. L.

Guillain, G. Contraction of Lids Caused by Voluntary Occlusion of Eyes. Soc. de Neur., Jan 12, 1922. Abst. Gaz. des Hôp., 1922, v. 95, p. 107.

A patient of 59 years, showed a phenomenon characterized by the fact that voluntary occlusion of the eyes caused a certain degree of rigidity or spasm of the orbiculares palpebrarum which prevented the eyes from opening for 10 to 15 seconds. Everything else was normal. There was no known etiology but in spite of the fact that the patient showed no neuropathic state, the author considered the condition a functional one. C. L.

Stähli, J. Ocular Palsy from Malignant Tumor of Nasopharynx. Klin. M. f. Augenh., v. 65, 1920, p. 888.

A woman, aged 62, otherwise healthy, presented a complete paralysis of the left abducens, which disappeared after 3 months, but relapsed 7 weeks later, on August 17, 1918. On January 2, 1919, she returned and complained that for 6 weeks she had diplopia, obstructed nose breathing with offensive discharge, and insomnia. The rhinological examination revealed an extensive inoperable carcinoma of the nasopharynx. On Feb. 14, right, slight ptosis, pupil horizontally oval, both pupils reacting sluggishly to light. V. R. 1. V. L. only perception of light. Both fundi, especially optic nerves, normal.

Second Case. A man, aged 49, showed on July 10, 1919, incomplete ptosis, paresis of the internal and superior recti, R. On July 19, the ptosis had almost completely subsided; and on July 27, all the paresis, so that the patient resumed work. After 2 weeks, again diplopia, hearing failed rapidly and also vision of the right eye. On Nov. 27, 1919, R. ptosis, pupil enlarged, reacted poorly. V. fingers at 1 mm., visual field concentrically contracted, optic disc somewhat pale, outlines indistinct. Left eye normal. The rhinologic examination revealed extensive inoperable sarcoma.

Stähli urges rhinologic examination in all cases of monosymptomatic ocular palsies. C. Z.

Maucione. Contributions to the Study of Ocular Leprosy. Arch. di Ottal. v. 28, 1921, pp. 247-260.

The author reports five cases of ocular leprosy. In most of them, both the iris and the cornea were affected by tubercular form of leprosy. The typical iritis showed the pupil occluded with exudate and many posterior synechia, often in both eyes. Sections showed numerous granulomatous nodules full of lepra bacilli, with also a few staphylococci as a secondary infection even in the deeper iris nodules. The cornea showed white plaques near the limbus, which proved to contain bacilli on section. In one case the whole choroid and ciliary body were diffusely infiltrated, the small vessels of the choroid being entirely replaced by a typical leproma showing many bacilli. The only two cases in which treatment was at all successful were cases four and five, in which after excision of the leprous nodule on the limbus, intensive treatment by sodium cacodylat was commenced at once. In both of these cases vision was retained or even increased during treatment and other general symptoms improved, during a comparatively short time of observation, however. Large doses of sodium cacodylat were given intramuscularly every two days. The author emphasizes the fact that deep lesions in these cases had existed for as much as three years before the superficial lesions developed, which argues for the endogenous route of infection as the usual one in these cases.

S. R. G.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. G. Martin, a prominent ophthalmologist of Bordeaux, died recently.

Dr. Clarence Warfield, Baltimore, age fifty-six, died May tenth from pulmonary tuberculosis.

Dr. Conrad W. Wilkowske, Chippewa Falls, Wisconsin, age forty-seven, was drowned June seventeenth, when the boat from which he was fishing overturned.

PERSONAL.

Dr. and Mrs. Charles H. May, of New York City, sailed for Europe July 5th.

Dr. H. Alexander Brown announces the removal of his offices to Suite 719, St. Paul Building, San Francisco.

Dr. George W. Jean of Santa Barbara, California, has just returned from a two months' trip East. He was host at the May meeting of the New York Ophthalmological Society held at Delmonico's.

Professor Fuchs, of Vienna, gave by invitation a three weeks' course of lectures on eye pathology, in San Francisco, beginning July tenth.

The Swedish Medical Association presented Professor Gullstrand with a gold medal to commemorate his sixtieth birthday.

Dr. and Mrs. Melville Black, who have been touring England and Scotland since May, returned to Denver July thirtieth.

Announcement is made of the appointment of Dr. Robert S. Lamb, Washington, D. C., as representative of ophthalmology on a committee for the continued study of local anesthetics.

The honor of knighthood was conferred, in June, upon Mr. Richard R. Cruise, surgeon-oculist to the King of England.

At a recent meeting of ophthalmologists of Germany, the Graefe prize was awarded to Behr of Kiel, Hertel of Leipzig, and Köppe of Halle.

Several doctors arrived in Honolulu with the Shriners, one of them being Doctor John A. Pratt of Minneapolis, Minnesota, who says he is enjoying every minute of his visit, and expects to pay us many more in the future when he needs a real rest.

Dr. William G. Rogers, Honolulu, has been ill with influenza for the past ten days. He expects to take a vacation and recuperate on the "big island," Hawaii, enjoying the cool breezes at an elevation of some five or six thousand feet, where an overcoat is needed every day and strawberries flourish the whole year.

MISCELLANEOUS.

The state of Kentucky has appropriated $200,000 for a new trachoma hospital at Pikeville.

The Governor of Minnesota has appointed a commission to investigate work for the blind and for prevention of blindness.

Dr. Charles B. Kobert, of Kentucky, started in June, in a fully equipped hospital wagon, for a six months' trip through the western part of the state. He will give free treatment to all persons suffering from eye diseases.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Cantonnet, A. Testing vision of aviator. (2 ill.) Presse Méd., 1922, June 10, p. 957.

Jackson, E. Pupil and visual acuity. A. J. O., 1922, v. 5, p. 585.

Strebel. Testing vision. Schweiz. med. Woch., 1922, v. 52, p. 456.

Szekrenyi, v. Stein's tonometer. Klin. M. f. Augenh., 1922, v. 68, p. 653.

Von der Heydt, R. Technic of observation with Gullstrand slit lamp. A. J. O., 1922, v. 5, pp. 537-539.

Woods, H. Eye examinations in neurotics or psychoneurotics. A. J. O., 1922, v. 5, pp. 555-560.

THERAPEUTICS.

Beaumont, W. M. Butyn; Substitute for cocain. Brit. Jour. Ophth., 1922, v. 6, pp. 316-319.

Bolone, T. Intramuscular injections of sterilized milk. Gior. di Oculist., 1921, p. 11. Abst. Rev. Gén. d'Opht., 1922, v. 36, p. 148.

Elschnig. Protein therapy in eye disease. Med. Klin., 1922, v. 1, p. 758.

Lanier, L. H. Present status of vaccine therapy in eye disease, with special reference to autogenous vaccines. (bibl.) Arch. of Ophth., 1922, v. 51, pp. 349-359.

Rollenberg Sampaio, J. M. Thyroid therapy in ocular affections. 1922, S. Paulo, Brazil.

Tobias, G. Focal reaction in eye in protein therapy. Klin. Woch., 1922, p. 515.

PHYSIOLOGIC OPTICS.

Brouwer, B. Visual projection in man. (ill.) Netherlands Cent. Inst. for Cerebral Investigation, Amsterdam. Abst. A. J. O., 1922, v. 5, p. 592.

Diaz-Caneja. Experiments of Wheatstone. (7 ill.) Arch. de Oft. Hisp.-Amer., 1922, v. 22, pp. 297-316.

REFRACTION.

Argañaraz, R. Asthenopia and ocular fatigue. Semana Med., 1922, v. 29, p. 994.

Dowling, J. C. Extraction of clear lens for high progressive myopia. Jour. Ophth. Otol. and Laryng., July, 1922, pp. 249-254.

Duane, A. Binocular accommodation. Arch. of Ophth., 1922, v. 51, p. 396.

Jeandelize, P. Infectious maladies causing paralysis of accommodation. Rev. Méd. de l'Est., 1922, p. 82. Abst. Rev. Gén. d'Opht., 1922, v. 36, p. 180.

Keyms, J. Axis of astigmatism and its location. Brit. Med. Jour., 1922, May 27, p. 838.

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HOW TO KNOW THE BLOOD PRESSURE IN THE VESSELS OF THE RETINA.

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PARIS.

The use of pulsation in the retinal vessels to determine when pressure made upon the eyeball causes the intraocular pressure to equal the blood pressure, has been worked out by Magitot and his associate Bailliart. The results of their studies are here given. The relation of intraocular and blood pressure to pulsation is explained; and that between the general blood pressure and the pressure in the retinal vessels is given. The technic, including the instrument by which pressure is made on the eyeball and the manner of using it, is given. The clinical applications worked out include recognition of hypertension in the spinal fluid, before the occurrence of choked disc, application to glaucoma, and angiosclerosis. For earlier work on this subject see p. 824.

Altho the phenomenon of retinal pulsation was already known, it is to Bailliart that is due the merit of having, in 1917, shown all the interest there might be in making use of this phenomenon for the physiologic and clinical study of the circulation of the blood in the eye, in a word, to observe "de visu," thru the ophthalmoscope, pulsations which in every other part of the organism we are obliged to feel, to listen to, or to register with different instruments.

The principle of the method consists in applying to an eye, the tension of which is known, pressures with a small instrument graduated in grams. By these means we provoke the appearance of the arterial pulse on the disc. At this precise moment, the pressure of the blood column is balanced by the pressure of the eye, and if it be possible for us to calculate this pressure in millimeters of mercury, we know the diastolic pressure of the retina.

It was with this end in view, that with Bailliart we undertook, in 1919, experimental studies to draw up a chart enabling us to estimate in millimeters of mercury the pressures exerted in grams on the eye. This subject was explained and developed by us at the International Congress of Washington last April. But in order to facilitate the use of the method by our colleagues, who have kindly interested themselves in the matter, my object in writing this article is to develop certain points which I was obliged to pass over during my oral communication, and on the other hand, to show what clinical interest every practitioner can draw from it.

PULSATION AND BLOOD PRESSURE.

Everyone knows that if the blood flowed in the artery with a constant pressure, there would be no pulsation. The arterial pulsation is due to the varying pressure of the blood column, difference between the two extreme cardiac phases, systolic and diastolic.

Normally the retinal arteries have a pulsation, and if this phenomenon is not perceptible with the ordinary methods of investigation, the reason is: First, the fact that the counterpressure exerted by the ocular tension on the arterial walls is not sufficient to balance the pressure of the blood column.

But if it happens that, the ophthalmotonous increasing, the tension rises to the same level as the blood pressure, the pulsations appear in all their amplitude. This elevation of the ophthalmotonus is realized when pressure is applied to the eyeball either with the finger or with Bailliart's pressure gauge. It occurs also in certain pathologic cases; and everyone knows the spontaneous pulsations which are seen to appear in some glaucomas. We

can draw from these facts the following conclusion: *The diastolic arterial pressure, i. e. the lowest, is normally higher than the ocular tension.*

For the veins, the question of the pulse is a little different. Its aspect is not similar to the arterial pulse. The arterial pulsation has the appearance of an abrupt, jerky movement, and this is easily understood when we remember its cardiac mechanism. The venous pulsation, on the contrary, takes the aspect of a rhythmic and slow sinking movement of the wall. Still, in certain cases, the venous pulse takes on the appearance of a piston like movement along the axis of the vessel.

Finally, whereas in a normal eye we never see spontaneous arterial pulsation, it often happens that we observe a *venous pulsation.* But when, as happens in 50% of the cases, this venous pulsation does not exist, it is always possible to provoke its appearance:

1. By pressing on the eye. This act increases the ocular tension. The venous pulse then appears, as does the arterial pulse when the ophthalmotonus balances the blood column.

2. By applying massage to the eye for a few minutes, or by pressing on it for a fairly long time with the finger. The result of this is to diminish the ocular tension. Therefore, when the venous pulse appears under these conditions, it is because the venous pressure was less than that of the ophthalmotonus.

From this we deduce the following physiologic principles:

1. *The arterial pressure is always higher than the ocular tension.*

2. *The venous pressure is not always so great as the ocular tension.*

We can, finally, lay down the following rule:

In order that pulsations may appear in the arteries or veins of the disc, it is necessary that the pressure exerted by the ocular tension on the wall of the vessels should balance the pressure of the blood column.

We have just spoken of pulsations. But let us suppose now that we press hard enough on the eye to drive the blood out of the arterial trunks, in other words raising the ocular tension to a higher level than the pressure of the liquid column. Then, at the instant when the last pulsation disappears, we can say that we have reached the limit of the greatest arterial pressure, i. e. the *systolic* pressure. This action may in fact be compared with that of the apparatus which compresses the humeral artery in the methods derived from Riva-Rocci's procedure.

Theoretically, it is always possible to know the systolic retinal pressure, and in Bailliart's method one should always endeavor to reach it by continuing to press with the instrument. But, practically, this is not always possible, and in cases of glaucoma, in which the tension is already very high, the pressure on the eyeball brings on violent pains or increases to such an extent the ophthalmotonus, that the disc appears in a fog. The knowledge of the systolic pressure, which is so important in physiology, is not, however, indispensable clinically, and the practitioner will find more profit in the knowledge of the diastolic arterial pressure. He should know that in a *normal eye:*

The *diastolic* arterial pressure of the retina is from 30 to 35 mm. Hg.

The *systolic* arterial pressure of the retina is from 70 to 80 mm. Hg.

But this is not all. He should compare this local pressure with the general pressure. In France, to estimate this pressure, we make use of a brace apparatus, such as Pachon's apparatus, or of instruments based on the auscultatory method, such as the Vaquez-Laubry apparatus. Like Bailliart, I give the preference to the latter, which, in a normal subject, gives the following figures:

Systolic brachial pressure, 140 mm. Hg.
Diastolic brachial pressure, 70 mm. Hg.

If we compare these figures with those of the arterial pressure in the retina, we get the following rule established by Bailliart:

a. *In the case of a normal general pressure, the ratio between the local arterial pressure and the general pressure*

is as 0.45 *is to* 1. (*General pressure* =1; *Retinal pressure* = 0.45.)

b. *In the case of high general pressure, the ratio between the local arterial pressure and the general pressure is as* 0.50 *is to* 1.

This rule is very important to know, and we shall see that the variations of these ratios have a considerable value from a clinical point of view.

Let us consider again the venous circulation.

The systolic venous pressure has not the importance of the systolic arterial pressure. From what I have written above, it follows that the diastolic venous pressure is always near to the ocular tension; that in certain cases it does not reach the figures of the ophthalmotonus, whilst in certain others it goes beyond it slightly. We conclude from this that the average figure of the diastolic venous pressure is about 22 mm. Hg. This figure may, however, vary in the same subject according to whether he is fasting or has eaten, according to the muscular work, the effort, etc.; in a word, all the acts which set up a stasis in the large veins, including the act of pressing on the patient's neck to compress the jugular vein.

But suppose we press rather hard on the eye: we shall immediately see the venous pulsations cease and then the vessel will appear to shrink and grow white as if its walls became thicker as the contents were reduced to a small thread of blood. If we continue to press, it will soon be seen that, before the stoppage of all circulation, the current dissociates itself and takes on a granular aspect. It is exceptional in a normal subject to see the vein resist even a hard pressure and not become flattened, under the influence of the pressure.

TECHNIC.

1. It is indispensable *to take first of all the ocular tension of both eyes* after having instilled a few drops of holocain. This tension is carefully noted.

2. The examination may be made with the patient either sitting, or lying, but it is customary to place oneself under the ordinary clinical conditions, i. e. the patient seated in front of the observer. According to preference, either the direct or the inverted image may be used. Similarly, pressure may be applied by the operator himself on the eyeball with the left hand whilst the right holds the ophthalmoscope. But it is essential to have a sufficient magnification of the optic disc to catch the first pulsation. The direct image gives the desired enlargement, but if we desire to use the inverted image, we must make use of Gullstrand's small hand ophthalmoscope. Recourse should then be made to an assistant to apply the pressure to the eye, the left hand being occupied with the magnifying glass.

We will suppose that we make use of the erect image:

(a) To examine the right eye the operation is simple. The right hand holds the electric ophthalmoscope. The left holds the pressure gauge perfectly horizontal between the thumb and the forefinger. The rounded end of the rod is introduced between the external canthus and applied to the sclerotic, whilst the patient's gaze is directed slightly towards the nose. By means of the little and third fingers the hand should support itself on the temporal region and hold the apparatus firmly while waiting to begin the pressure on the eyeball. The figures marked on the rod of the apparatus should be turned towards the observer. (Fig. 1.)

The attention of the ophthalmologist should be *directed to the disc. It is there and not elsewhere that he must observe the blood flow.* It is in fact the only place where the pulsations are clearly visible, for it is the sole region in which the vessels are not covered with glial tissue and optic fibers.

The observer should also accustom himself from the start to distinguish rapidly the veins from the arteries, and then every beginner should train himself to note the difference between the arterial and the venous pulse.

(b) When the observer obtains perfect visibility of the vessels, he begins to press on the eyeball. As soon as he perceives a first pulsation either ar-

terial or venous, he must hold his hand perfectly still and, ceasing to look at the disc, direct the light of his ophthalmoscope on the scale to note the figure. Then he looks again at the disc and continues the pressure until the pulsations have ceased. He then notes the figure once more.

Most Important Remark. Any pressure on the eyeball causing a fall in the ophthalmotonus, it is indispensable not to press too slowly. Likewise, if a mistake has been made and it is considered necessary to take fresh measures, an interval of five minutes must be allowed so that the tension may become normal again.

When one has observed the first pulsation which gives the diastolic pressure, one continues rapidly to reach the systolic pressure. If pressure is applied too slowly the following phenomenon is observed:

The disc is seen to grow white, then the pulsations begin again. If the pressure is continued and slowly increased, the pulsations do not disappear. This is due to the fact that the *more one presses on the eyeball, the more the tension falls.* The figures obtained will be false for they cannot be utilized with those of the initial tension.

Every beginner should above all, practice studying first the diastolic pressure. It is the most important. When he has acquired a certain familiarity with it he will study the systolic pressure. But in principle one should practice noting the exact moment at which the first arterial or venous pulsation appears. For a certain time the estimation will be wrong; for the observer, not being sufficiently trained, will not cease his pressure until he has gone beyond the critical figure. But we may boldly affirm that a practitioner who knows how to use his ophthalmoscope will not take more than ten days to acquire the necessary skill.

Fig. 1. Method of making pressure on the eye to induce pulsation of the retinal vessels.

Fig. 2. Method of making pressure on the eye and seeing pulsation produced, if not able to use left hand for ophthalmoscope.

(c) The examination of the vessels of the left side necessitates a certain dexterity on the part of the observer. He is in fact obliged to hold the pressure gauge in the right hand and his ophthalmoscope in the left.

Dr. Bailliart, who was unable to become left handed, has recourse to the method indicated in figure 2.

I could add that for my part I practice the examination of the vascular pressure by utilizing Gullstrand's hand

ophthalmoscope, and the pressure on the eyes is applied by a nurse or an assistant. The assistant places himself behind the patient's head; he immobilizes the pressure gauge as soon as I see the pulsation appear, and it is he who reads the figure on the scale. When one is accustomed to the method, not more than one minute is usually required to know the diastolic and systolic pressures of the retina.

(d) Bailliart's pressure gauge,[1] is a simple apparatus of which two or three other models exist. The current model is that represented in figure 3. It has

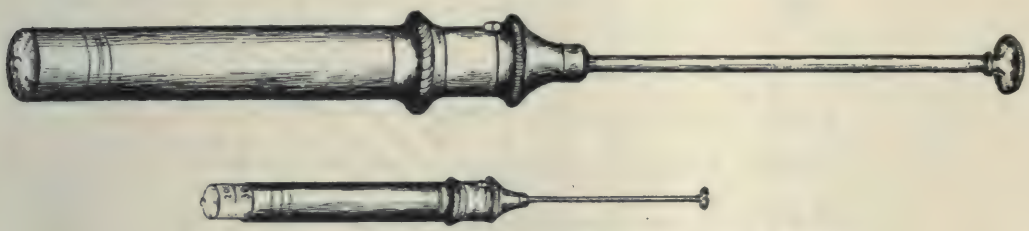

Fig. 3. Bailliart's pressure gauge for making definite pressure on eyeball.

the advantage of being sensitive, but its scale is difficult to read, particularly in the dark.

A new model, actually under construction, has a dial on which the figures are much more easy to read.

These apparatuses are made to be used horizontally, so that their own weight may not affect the results. It is moreover very easy to verify their correctness by means of a pair of scales. The instrument is firmly held in a clamp (Fig. 5), and its lower extremity is placed in contact with one of the scales. It is sufficient then to place in the other scale the weight in grams to verify the exactness of the figures on the scale of the pressure gauge.

The spring which forms the principal part of the gauge is of hard steel, so that practically it insures the precision of the apparatus for a long time. But it sometimes happens that the rod is slightly out of true, producing abnormal friction. Similarly, in the long run, dust may penetrate between the two parts which fit into each other. All that is necessary is to have the apparatus taken to pieces by a mechanic and to have it trued on a lathe, if required.

(1) Bailliart's pressure gauge is made by the firm of Boulitte, Paris, Rue Bobillot, 16. The model with a dial is made by the firm of Pirard & Coeurdevache, Rue Blainville No. 7, Paris.

CLINICAL APPLICATIONS.

It is extremely important to be imbued with the idea that the figure of the local blood pressure has a clinical value, only if it can be compared:

(a) with the figure of the ocular tension.

(b) with the figure of the general pressure (systolic and diastolic).

1. The ocular tension will be taken with Schiötz's tonometer. This tonometer is indeed the one which was used to draw up the chart herewith, which enables us with two readings to convert into mercury millimeters the figure indicated by the gauge. The reader will easily perceive that the abscissas are the markings in grams whereas the ordinates show the markings in millimeters of mercury.

Here is an example: Suppose an eye, the initial tension of which (before any action is taken) is 20 mm. Hg., and in which the first arterial pulsation appears under a pressure of 30 grams. Take the chart and follow the curve which begins at the figure 20 mm. Hg. Follow it until we reach the column headed by the figure 30, and look now for the level we have reached in mercury millimeters. We find 35 mercury millimeters. It is the figure of the retinal blood pressure. (Fig. 4.)

As this figure depends on that indicated on the tonometer, it will be easily understood that it is important to have a perfectly exact Schiötz to-

nometer. This is not always the case with those sold in the shops. Those we made use of for drawing up the chart were tonometers which had been verified in the course of manometric experiments.[1]

2. Knowing the ocular tension and the local blood pressure, it is finally

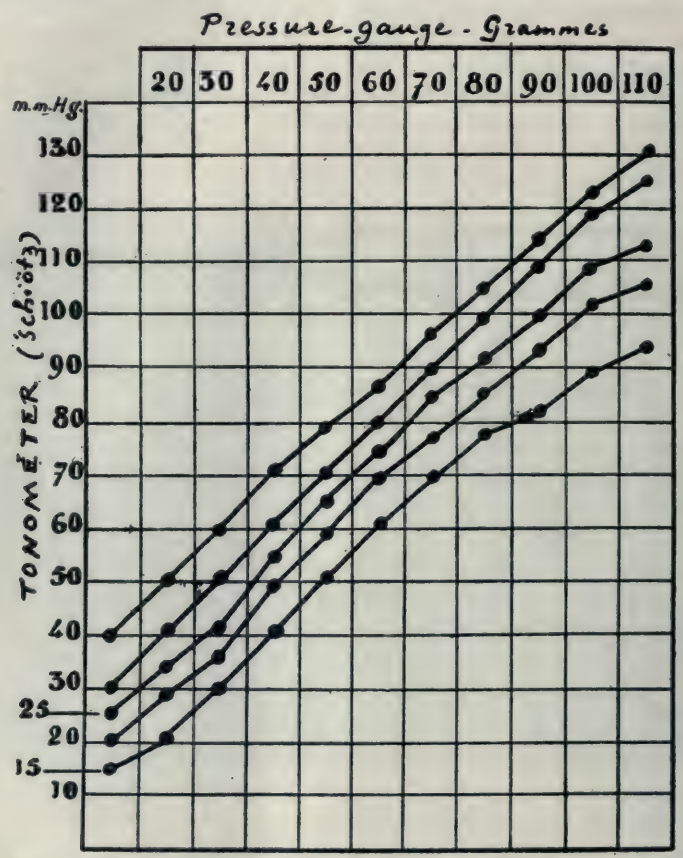

Fig. 4. Chart enabling us to estimate in millimeters of mercury the pressure exerted in grams on the eye.

necessary to know the general blood pressure. For this, use should be made of one of the modern apparatuses with armlet placed on the arm and, to insure further precision, the auscultatory method should be used.

It is the comparison between the figures of the local and general blood pressure which alone has a clinical value and the following rule which constitutes the *normal formula* should be remembered:

(a) The normal arterial general pressure and local arterial pressure are to each other as 0.45 is to 1. Example:
General diastolic pressure...60 mm. Hg.
Local diastolic pressure.....35 mm. Hg.

(b) The high general arterial pressure and the local arterial pressure are to each other as 0.50 is to 1. Example:
General diastolic pressure..100 mm. Hg.
Local diastolic pressure.... 50 mm. Hg.

Starting from these normal formulae we will review a few pathologic formulae:

A. Choked Disc.

The formula is as follows:

The *general* blood pressure:
Diastolic .....normal
Systolic .....normal

The *local* blood pressure:
Diastolic .....high
Systolic .....often normal

(1) The firm of Guilbert, Opticien, Rue de l'Odéon, Paris, sells at present tonometers which have been tested and marked at the Lariboisere Hospital.

The study of a certain number of clinical cases has moreover shown that every time this formula has been met with, there was a hypertension of the spinal fluid even if there was no choked disc. It is therefore clinically possible now to discover an important pathologic phenomenon before the appearance of the objective sign which is a consequence of it.

Here is an instance: A man who had been wounded in the war, and who showed some symptoms of Jackson's epilepsy, complained of pains in the head. There was no choked disc but I found an ocular tension of 30 mm. Hg., a general diastolic pressure of 70 mm. Hg. and systolic of 135 mm. Hg. The local diastolic pressure was 70. mm. Hg. The normal formula (as 0.50 is to 1), no longer existed since the two diastolic pressures, local and general, were identical.

I diagnosed great hypertension of the spinal fluid. Puncture in the lumbar region justified this diagnosis and by means of radiography a small intracerebral projectile was discovered.

B. Angiosclerosis of the Retina.

General pressure:
Diastolic .....high, normal, low
Systolic .....high, normal, low
Local pressure:
Diastolic .....low
Systolic .....low

The arterial pulse is besides often feeble. Sometimes it is located in a segment of the arterial trunk.

Example: A patient complains of visual fog. The vessels, arteries and veins, appear normal, but the general diastolic pressure is 120 mm. Hg. The local pressure is diastolic 45 and systolic 75.

If we compare the difference between the diastolic pressures, we no longer find the proportion of 0.50 to 1, but of 0.38 to 1. Moreover, it must be noted that the local differential pressure is diminished, i. e. the difference between 45 and 75 is indeed much less than the normal difference (which is 30–75). This formula appears before the hemorrhagic lesions. It is a precocious symptom which enables us to diagnose vascular lesions when the patient, while still possessing normal sight, complains of passing obnubilations, and of myodesopsia. A very similar formula is found in retinitis gravidica and albuminurica.

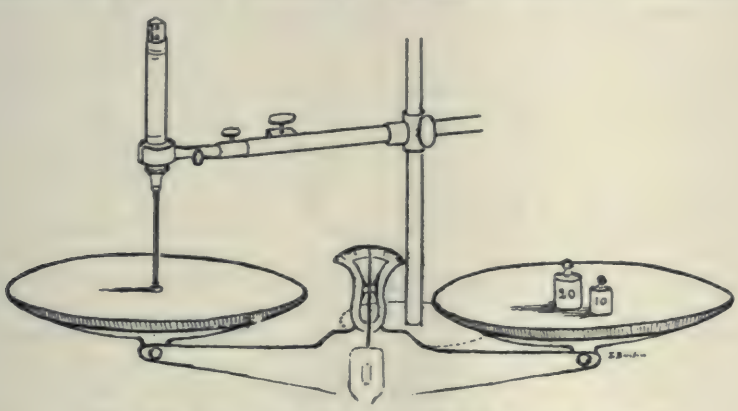

Fig. 5. An easy way to test accuracy of the pressure gauge.

C. Glaucomas.

In glaucoma in general we find the following formula:

General arterial pressure:
Diastolic .....normal or high
Systolic .....normal or high
Local arterial pressure:
Diastolic .....high
Systolic .....high
Local *venous* pressure.....very high

In 57 cases of glaucoma Bailliart found eleven times the spontaneous arterial pulse and seven times the spontaneous venous pulse. This indicates that in 19% of the cases, the arterial diastolic pressure was counterbalanced

by the ocular tension, and that in 13% the venous pressure was also very near to the ocular tension. As in these 57 observations, there was an average tension of 55 mm. Hg., it will be seen by that how great the local blood pressure is in glaucoma. This agrees very well with the idea I hold, that glaucomas are due to an inflammation of the choroid and not to an obstacle in the flow of the aqueous humour.

As to the local systolic pressure, it is often very difficult to know its exact figure. In an eyeball, the tension of which is already high, a pressure with the dynamometer clouds the vitreous humor and causes the visibility of the disc to disappear. Still, attentive study of certain cases has enabled us to find out:

That the ocular tension followed the local systolic pressure in a parallel manner.

That this local systolic pressure was relatively less high than the local diastolic pressure.

It is to the elevation of this arterial diastolic pressure that is due the appearance of the spontaneous pulse. The conclusion to be drawn is that the observation of the *spontaneous arterial pulse* should be considered as an alarm signal.

When, finally, we find ourselves in the presence of ocular disturbances rendering research for pulsations impossible, we should remember that every time that the ocular tension is superior to half the humeral pressure, the circulation of the retina is unquestionably disturbed.

As for the venous pressure, it is very high, since it sometimes reaches the figure of the ocular tension. It should be added that the venous circulation seems to be affected solely in the eyeball. In fact we see none of the ophthalmoscopic symptoms (tortuousness, edemas, hemorrhages) which indicate a difficulty of the circulation as in thrombosis of the orbital veins. Moreover, we know that, as soon as the veins have left the eyeball, they dilate; it is what takes place in the case of episcleral veins. The principal cause of this dilation is the pressure of the liquid column which is no longer counterbalanced by the ocular tension.

D. There are other affections in which the local blood pressure has been examined, but the cases studied are not yet sufficiently numerous to enable us to deduce a formula from them. It is thus that I have observed a case of posthemorrhagic blindness, cases of traumatic myopia, and that Bollack has observed a case of quinin blindness. But the method is still too recent to permit of yielding all we have a right to expect from it. It is for this reason that I have written this article, in order to interest my colleagues in a new technic which, from the results already obtained, seems to deserve to take its place in the current practice of ophthalmology.

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EPIDEMIC ENCEPHALITIS FROM THE STANDPOINT OF THE OPHTHALMOLOGIST.

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The recent history and general characteristics of this disease are described. Five cases are reported, in two of which there was inflammation and swelling of the optic nerve head. The importance of the disease is pointed out and the fact that it lies in the domain of the ophthalmologist. Read before the American Ophthalmological Society, May, 1922.

It is important for the ophthalmologist to have a working knowledge of epidemic encephalitis, because he may be the first physician consulted by the patient, or his counsel may be sought by the internist or neurologist. The ocular disturbances are often of rapid onset and sometimes of a very distressing character, and may be the first or even the only symptoms noticed.

Happ and Mason[1] have made a thoro clinical study based on 81 cases of this disease, observed in hospital wards and followed up after discharge. They refer to 119 publications on the subject.

The recent epidemic of encephalitis was first noticed in Austria and Northern France, during the winter of 1916-17. The following winter it appeared in Paris. It was soon recognized in other parts of Europe and in England; and by another year, probably aided by extensive troop movements, it had spread over the world, becoming a great pandemic.

The association of epidemic encephalitis with epidemic influenza, noticed in the last few years, has also been observed for four centuries; sometimes one disease preceded the other, again the two diseases occurred simultaneously. The lesions of the nervous system are many, diverse and widespread, hence the variety of descriptive adjectives coupled to encephalitis. The virus lingers for a long time in the central nervous system. As one area is recovering, another may be attacked, greatly prolonging the period of disability.

The first symptoms are likely to be those common to the initial stage of an acute infectious disease, such as fever, headache, vomiting, irritability and restlessness. The young may have delirium or convulsions. Later, there develop drowsiness, coma or insomnia, diplopia, ptosis or other ocular disturbances, tremors, muscular jerkings, spasticity, general weakness, mask like face, and various psychic disorders, especially during convalescence. Sometimes sleeplessness at night alternates with deep sleep by day.

The duration of the lethargic state for weeks or months gave rise to the first designation of this disease as "encephalitis lethargica." However, in some cases there is no lethargy. All things considered, probably "epidemic encephalitis" is the best classification for this disease.

Headache persisting for weeks or months may be wholly dependent on encephalitis, and not necessarily a sign of brain tumor or abscess, even in the presence of papilledema. The headache of tuberculous meningitis is of a different character, and this disease is usually rapidly fatal.

Of the ocular symptoms, diplopia is frequently the first indication of involvement of the nervous system, and may be the first sign of encephalitis. The palsies of the eye muscles are characteristically transient and variable. Ptosis is frequent, often bilateral, seldom complete. Weakness or even loss of convergence is common; insufficiency of accommodation also occurs. Nystagmus of various types is present in a large number of cases. Pupillary inequalities and irregularities are seen. Optic neuritis is occasionally observed, either in a mild or a severe form, and in one or both eyes.

Holden[2] makes the observation that ophthalmologists have noted more cases of paresis of accommodation and diagnosed paresis of motor muscles of the eyeball more accurately, than is done by hospital groups, altho he ac-

knowledges the statistical value of such reports and draws valuable data therefrom. Eye symptoms noted in 100 consecutive cases of epidemic encephalitis, at the Mount Sinai Hospital, gave the following percentages: Blurring of the optic discs, 4. Papilledema, 1. Ptosis of both eyes, 45; of one eye only, 11. Paresis or paralysis of the various motor muscles of the globe sufficient to cause diplopia, 55, of which 44 were of the external recti. Nystagmus, 32. Irregular pupils, 15; unequal, 20; sluggish or absent light reflex, 35, in 13 of which the convergence or accommodation was also sluggish. Weakness of accommodation in both eyes, 1. Weakness of some or all of the muscles supplied by the facial nerve: both sides in 24, one side only in 49.

Holden believes that true papilledema is a very rare symptom of encephalitis, a concomitant of unusual complications, and usually the result of increased intracranial pressure. He points out that from the widespread inflammatory changes in the brain, muscular disabilities varying from weakness to paralysis must occur. Diplopia usually disappears early, ptosis later, and pupillary anomalies and weakness of accommodation last of all. He thinks that during an epidemic, encephalitis may be diagnosed from the ocular symptoms alone if lues is eliminated.

The microscope shows no essential difference between the vascular and perivascular changes of syphilis and those of encephalitis. This would account for the similarity of symptoms in the two diseases. Dickinson[3] speculates on the frequency with which mild cases of encephalitis have been diagnosed as syphilis of the central nervous system and treated as such, and their recovery attributed to mercury and the arsenol compounds. A very important point in differentiation is the duration of the muscular palsies. In syphilis the lesion is generally of long standing before it yields to treatment, while in encephalitis the paralysis is fleeting, and may shift from one muscle to another.

Spaeth[4] observed five cases of "encephalitis lethargica," all of which showed various ocular symptoms. One case had binocular optic neuritis of a mild type, another had partial corneal anesthesia in one eye and almost complete anesthesia in the other, and all five cases had muscular involvement. All were more or less acutely ill, the longest period of disability being 3 months. Spaeth believes that "great care must be taken as to treatment during the acute, irritant stages of the disease." This also applies to a rather prolonged period following recovery, to prevent possible relapse.

Taylor[5] reports six cases in which diplopia or ptosis, or both these conditions, were amongst the earliest symptoms of which the patients complained. The general clinical picture was that of encephalitis. One case showed double ptosis, divergence of one eye, weakness of all eye movements and nystagmus to right and left, with normal pupillary reactions. Some of Taylor's cases had the aspect of paralysis agitans without tremor, and others a mask like face, after the disease had run its course. Only two of his cases made a complete recovery.

Monro[6] describes seven cases, one of which had well marked optic neuritis, with hemorrhages. He gives a good description of the cardinal symptoms of epidemic encephalitis and alludes to its special tendency to attack the pons and midbrain, causing edema, hemorrhage and degenerative changes.

Pickard[7] relates five cases, all of which showed diplopia and paresis of accommodation. Four of the cases had optic nerve disturbances. He thinks that mild cases of encephalitis may be commoner than is thought. The ocular symptoms establish the diagnosis in such cases.

Haynes[8] gives a good description of the disease with the exception of the statement that the fundus oculi is normal, and quotes Farquhar Buzzard's observation that an inflammation of the encephalon can produce as many symptoms as there are functions of the brain. He also outlines the treatment.

Commenting on the few references to changes in the fundus oculi or in the visual function, that he had been able to find in the literature on encephalitis, Symonds[9] reports four cases of bilateral optic neuritis which he observed at American hospitals which he visited.

Patton[10] considers encephalitis from the ophthalmic viewpoint, carefully reporting three cases. The discussion of his paper brings out interesting features. Reference is made to the statement of Morax, that when ocular symptoms are wholly absent, the propriety of classifying cases as "lethargic encephalitis," is questionable. Patton calls attention to the importance of determining the presence or absence of encephalitis, in the presence of unexplained diplopia, ptosis or irregular pupillary reaction.

Hogue[11] reports the incidence of the disease and the mortality in Wisconsin, and records four cases with the usual eye symptoms. He details the frequency of the various ocular disturbances, and the order of their disappearance. Only two of the cases showed lethargy.

Waardenburg[12] describes two cases studied by himself, and compares them with the cases published in Holland, and reviews the accounts of this disease as given in other countries. The general symptoms are first outlined and the ocular manifestations, motor, visual and pupillary, are taken up in detail. Charts are given indicating fields of fixation as well as fields of vision. He also calls attention to the importance of the ocular symptoms in determining a diagnosis of encephalitis.

Griffith[13] elaborates his earlier study of acute nonsuppurative encephalitis, particularly as it affects the cerebellum, and as it is manifested in children. He has collected records of thirty-one cases, in addition to four reported by himself. They mainly occurred independently of any epidemic, often closely following acute infectious diseases, and could not be attributed to an encephalitis of any specific microbic nature, altho that relationship was possible. He considers the prognosis good as to survival, but that complete recovery is uncertain.

Cadwalader[14] points out the practical impossibility of separating the lesions of acute anterior poliomyelitis from those of epidemic encephalitis, under microscopic study. This suggests the naturally close resemblance of the clinical phenomena of these two diseases. Epidemic poliomyelitis occurs mostly in summer and chiefly among children, epidemic encephalitis usually occurring in the winter months and largely among adults. Lethargy is not always present in the latter disease, and it occasionally occurs in the former affection. The identity of the microscopic findings in some cases of epidemic encephalitis and in early cases of multiple sclerosis explains the resemblance of the manifestations of these diseases.

He calls attention to the rare but definite involvement of the spinal cord in epidemic encephalitis; and refers to a case of binocular blindness following optic neuritis.

Ophthalmic Literature[15] has a lengthy review which covers most of the important papers dealing particularly with the eye symptoms of encephalitis. Under the general title of Ocular Manifestations of Encephalitis[16], the European journals deal with this subject along the same lines already laid down; while Bollack[17] deals with nystagmus and Demole[18] with internal ophthalmoplegia, in this disease.

The following illustrative cases are taken from the practice of the writer, except case 4, which is kindly furnished by Dr. W. C. Finnoff.

Case 1. On Sept. 28, 1921, a man of thirty-one was taken with severe headache, delirium which lasted for a week, and fever which rose to 104° F. No diplopia was noticed. At the end of a month, when the eyes were first examined, the right pupil was larger than the left (but not dilated ad maximum) and the papillae were slightly hyperemic, the left disc being blurred at the nasal margin. There was one degree of right hyperphoria, the accommodation of the left eye was 1.25 D. weaker than that of the right, and there was marked asthenopia. A week later a "nervous break-down" occurred. Recovery from the acuteness of this at-

tack was followed by blurring of vision, marked dizziness and early fatigue of the accommodation, which had fallen off 0.50 D. more in the left eye. The pupils were now equal and the fundi were normal. The patient's nerve-tone remained very poor.

Case 2. On Nov. 19, 1919, a boy of fourteen years who had had fever, pharyngo-tonsillitis and general malaise for three days, suddenly developed bilateral mydriasis and marked ptosis of the left upper lid. Twelve hours later the pupils were normal as to size and reactions, and the ptosis was reduced one-half. Four days later the ptosis had disappeared. Soon after this the right pupil dilated once, for a few hours only. The ptosis returned for brief periods when very tired. The slowness of recovery, long after the throat was well, the lethargy and the ocular findings led to a diagnosis of a mild attack of epidemic encephalitis, as in the following case.

Case 3. A man of fifty-six presented himself on Nov. 22, 1919, stating that a week before he had vomited several times, diplopia appeared the next day, and severe frontal headache came on the second day following. He had never had double vision before. Examination showed twenty degrees of left hypertropia, the left eye turning 2 1/2 mm. above the horizontal meridian, and there was ptosis of the left upper lid. Otherwise the eyes were normal except for errors of refraction. The man was noticeably lethargic for nearly two weeks; after which the lethargy, diplopia and ptosis promptly disappeared.

Case 4. Three weeks before, a man of forty-six had suddenly developed severe pain in the head, and fever quickly followed. When the temperature was first taken it was 103°. Physical examination revealed a left sided pneumonia. In a few days he became lethargic and remained so for 4 or 5 days. As pneumonia was thought to be the cause of the constitutional symptoms, no neurologic examination was made, and the signs of lethargic encephalitis were not looked for. After recovering from the lethargy, the patient noticed that his vision was blurred and that he had diplopia; also, that he was confused mentally at times. His physician observed that the lids did not close entirely during sleep, and noted a condition of the eyes which he thought was lateral nystagmus. The pneumonia cleared in ten days but was followed by a pulse of only 29 per minute. The patient was very weak and dizzy most of the time. The vision continued to blur and diplopia was noticed; and it was for these conditions that an ophthalmologist was called on July 5, 1921. R. V. 20/20, L. V. 20/20. With his former reading correction he could read with either eye separately, but could not read with both. Slight diplopia. Muscles: Dist., left hypophoria 2.5 cr., esophoria 4 cr. Near, left hypophoria, 6 cr., increased in upper field. Confused mentally, so that the full error in all fields could not be measured. L. eye lags in upward and outward movements. Esophoria, 20 cr. Accommodation retarded. R. disc red, swollen 0.5 to 1 D., edges indistinct, veins engorged and slightly tortuous, arteries slightly contracted. L. neuroretinitis, disc swollen 2 D., arteries contracted, veins markedly engorged and tortuous, and small hemorrhages and exudates on surface of disc. July 10, R. V. 20/20 plus, L. V. 20/30 partly. L. hypophoria, esophoria. July 15—Gaining in strength. Only two short periods of blurred vision. Near: vertical balance, esophoria 6 cr. Slight improvement of optic disc. July 22—Feels much better, and does not become confused or lethargic. Eyes comfortable. V. 20/20 plus in each. Muscle balance good except 6 centrads of esophoria for near. R. disc less congested and less obscured at margins. L. disc swollen 1 D., its exudates less and its hemorrhages absorbing. Fields of both eyes normal by arc perimeter and by Peters' campimeter. July 29—Weak and dizzy, but clear mentally. V. 20/15. Near: vertical balance, and 0.5 cr. of esophoria. Slight blurring of upper nasal quadrant of R. disc, remainder normal. L. disc swollen only 0.5 D., margins still blurred, two flame shaped hemorrhages 1/6 d.d.

in upper half of disc, near margin. Aug. 6—Vertical and lateral balance for distance. L. disc decidedly improved, no swelling, hemorrhages absorbing. Dec. 19—Patient reports that he is well but not so strong as formerly.

Case 5. On April 15, 1921, a man of twenty-two sought relief thru glasses from occasional "filmy vision" in the previous month, and headache, from which he had suffered for ten days. The headache was of a stabbing character, was in the lower occipital region, and occurred several times a day. There was a mild neuroretinitis in the right eye, while this condition was pronounced in the left, without hemorrhage. R. V. 5/4 partly, L. V. 5/10 partly. There was no central color scotoma. The patient was referred for examination of the nasal accessory sinuses, the tonsils, teeth, blood, spinal fluid, kidneys and other important organs. Thoro physical examination resulted in negative findings only. Slight tremor of the hands was noticed in 1919. There had been a moderate influenza in the fall of 1918; good recovery. In Aug. 1919, he received a blow on the head; not rendered unconscious. Radiographs showed "lack of the posterior clinoid process; also a small calcified area above the tentorium, which appears to be the center of a tumor mass." On Apr. 18 the left disc was choked, and the vision was down to 5/15. On the following day Dr. Robert Levy opened the left antrum, ethmoid and sphenoid, and did a double tonsillectomy. He found the ethmoid soft, the sphenoid and antrum normal, and that the small, submerged tonsils contained a scanty mucopurulent secretion. A week later the left disc was less swollen, and the vision had risen to 5/10 partly. The vision of the left eye dropped to 5/22 in the following eight days. May 2, 1921, the right disc was swollen 5.50 D. and the left 7.50 D. Both blind spots were much enlarged, especially the left. The lower field of vision in the left eye was largely lost. There were no retinal hemorrhages. Two days later spinal fluid found negative to all tests, as was the blood to the Wassermann test.

On May 6, Dr. H. T. Pershing began a neurologic study of the case, and ordered prolonged rest in bed, and prescribed potassium iodid and mercury. By May 31, the neuroretinitis had subsided in the right eye, and largely so in the left, with but one diopter of swelling. Vision was R. 5/4 partly, L. 5/22. On June 20, the right nerve protruded forward 4 D., the margin was clearly defined, and the vessels dipped over the edge. The left disc was swollen 2 D., and there were new vessels and minute hemorrhages on its lower nasal quadrant.

Sept. 10—R. V. 5/12 partly, L. V. 1/60. From this time the edema of the optic discs generally subsided, with occasional remissions, and the vision of the right eye gradually failed. The spinal fluid pressure was 400 mm. of water on Oct. 4, and 330 on Oct. 15. Vision improved slightly after the first withdrawal of the fluid, but the second had no such result. On Dec. 14, 1921, there was complete optic atrophy, loss of pupillary reflexes except to direct sunlight, and the vision light perception only in the left eye and possibly 1/60 in the right eye. The patient was still confined to the house; tho rather weak, was clear mentally and would soon go outdoors. In April, 1922, R. V. = 8/200, and the mental and physical condition was excellent.

The following note is from Dr. H. T. Pershing, who collaborated from the neurologic standpoint.

"My reasons for thinking this is a case of encephalitis are as follows:

"1. Meningitis is excluded by the infrequency and short duration of the headaches, the absence of vomiting, fever, delirium and of all cranial nerve affections except the optic neuritis, and the normal condition of the spinal fluid. The differential diagnosis is really between encephalitis and tumor.

"Against tumor are the following:

"1. The rapid onset: from the first symptom of which we are sure, until headache was severe and vision distinctly affected, was not more than a week or at most ten days.

"2. The absence of vomiting and of slow pulse.

"3. The entire absence at all times of any other cranial nerve symptom than the optic neuritis.

"4. The normal condition at all times of gait, station, voluntary motions and the reflexes, especially the knee jerks, heel jerk and plantar reflex.

"5. The infrequency of headache after the first onset of the illness. It occurred only as an immediate result of the spinal punctures.

"6. Absence of such progress in the development of symptoms as we generally see in tumor.

"In favor of encephalitis is the fact that the disease had been occurring in Denver and Colorado since the winter of 1918-19, and also that it can have a selective action on a limited portion of the brain. The optic nerve is really a part of the brain."

COMMENT

As will be observed, these five cases ran the gamut of ocular symptoms, from transient muscular palsies to destructive optic neuritis. In some the general manifestations were severe, in others mild. Cases 4 and 5 illustrate an involvement of the optic nerve not suspected earlier in the epidemic, but which the nature of the disease should lead us to expect.

The experience of the past four years justifies the conclusion that epidemic encephalitis is a disease of great importance, often of marked severity, and with a tendency to a prolonged course and to relapses. It so commonly attacks the eye, that a diagnosis of encephalitis in the absence of ocular manifestations, may well be doubted. On the other hand, it is possible to diagnose the disease from the eye symptoms alone, if syphilis is excluded. In mild cases there may be no symptoms complained of except the ocular disturbances. As no function of the brain is immune in encephalitis, so the various functions of the eye seem liable to attack. And as the virus of this dread disease shows its ill effects upon the general nervous system for years, so we may expect the eyes to show persistent if not permanent damage to the structures that were seriously affected. We must be careful, later on, not to confound these pathologic changes with those of nerve syphilis.

Epidemic encephalitis seems to lie in the domain of the ophthalmologist quite as much as in that of the neurologist or internist. However, the ideal attitude in the diagnosis and treatment of this as of all diseases, is one of cordial cooperation.

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SYMPATHETIC IRIDOCYCLITIS.

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A case is here reported following perforating injury in a man of 67, the eye being removed at the end of eleven weeks after the injury, five weeks after evidences of involvement of the second eye. Fair recovery followed extraction of infected teeth and treatment. Pathologic examination of the exciting eye by Dr. William C. Finnoff of Denver. The essential character of the disease is discussed in detail. Reviewing theories of pathogenesis heretofore put forward, the view is favored, that the condition is not specific, but may be brought about by infection from foci previously established within the body. Read before the California State Medical Association, May, 1922.

Mr. H., aged 67 years, received a perforating injury to the right eye, six weeks previous to coming under observation. Sight failed immediately following the injury. Owing to the patient being in the mountains many miles from medical attention, home remedies were the only measures instituted. The eye continued inflamed and at intervals more sensitive than others. Sight in the left eye had been failing for two years preceding the injury. Recently this eye became slightly red.

Examination showed the right eye to be absolutely blind, markedly injected, mushy, and very sensitive to touch. The degenerative changes incident to an eye becoming phthisical were present. There was evidence of a perforating wound at the nasal corneo-scleral juncture. The left eye showed a vision of 6/60. Very slight ciliary injection, iris responded promptly but irregularly and not fully to light stimulus. On the anterior lens capsule were two very minute pigment spots. The lens showed peripheral shoots and a very hazy nucleus.

Immediate enucleation of the injured eye was advised. The patient did not accept the advice at this time, but returned five weeks later (eleven weeks after the original injury). He complained that the sight of the left eye suddenly failed a few days previous. Moderately severe neuralgic pains radiating up over the left brow. The eye presented marked ciliary and conjunctival injection, ciliary tenderness, and a very hazy cornea. Deep in the cornea were several small mutton fat spots. Descemet's membrane showed numerous fine pigment deposits. The anterior chamber was shallow. The pupil irregularly round. The iris nonresponsive to light and bound down to the anterior capsule. The texture of the iris appeared disturbed, and at the pupillary border to the temporal side were two, slightly yellowish, dark, pin point nodules. Light field good. Vision equaled hand movements at two feet.

The offending eye was promptly removed, atropin, purges, sweats, and sodium salicylat were administered. Owing to the difficulty of controlling the patient, being ambulatory, these measures were carried out very indifferently. During the succeeding 18 days there was only moderate improve

ment. Temperature observation every three hours for five days, was normal, Wassermann, tuberculosis and gonorrhea reactions were negative. Radiographs of his teeth showed extensive disease in the form of dental caries, apical abscesses, pyorrhea, and alveolar necrosis. His mouth was thoroly cleaned up. Within twenty days the left eye showed definite improvement, vision equaled 1/60. At the end of two months, the eye, practically quiet, had a vision of 5/60. It is now 15 months since the attack; during this period there has been no recurrent outbreak. The lens has become more opaque and swollen; V. —4 = 6/15.

The question of removing the cataractous lens is a problem for the future.

The following excellent notes from Dr. Finnoff's careful study of the offending eye confirms pathologically the clinical diagnosis of sympathetic disease.

Microscopic Appearances. The corneal epithelium varies in thickness, and is thinned in the greater part, to about 3 layers of cells (probably postmortem artifact). Bowman's membrane is intract thruout its whole extent, is normal in thickness, but is wavy. The substantia propria varies in thickness, due to edema of the lamellar fibers. The greatest swelling is near the center of the cornea. The corneal cells have undergone cloudy swelling, and the intralamellar spaces have been separated by fluid. The irregular thickening of the substantia by edema, accounts for the wavy appearance of Bowman's membrane and a folding of Descemet's membrane. Near the limbus, on either side, the cornea thins down to almost its normal diameter. At the limbus, on the side which was wounded, Bowman's membrane dips backward and is covered. In front of this, under the epithelium, there is a thin layer of granulation tissue, in which there are several new formed pigmented epithelial cells. Some of the cells have broken down, and the pigment granules are seen scattered thruout the new formed tissue. In the substantia, on the wounded side, several blood vessels have wandered in between the lamellæ. For a distance of about 2 mm., Descemet's membrane is thrown into several sharp folds.

Only an occasional endothelial cell is seen on the posterior surface of the cornea. The corneoscleral lamellæ, in the region of the scleral spur, on the injured side of the eye, have been ruptured by the trauma, and the wound is filled with polymorphonuclear leucocytes, lymphocytes, plasma cells, degenerated pigment cells, pigment granules, and fibroblasts. The meshwork of the filtration angle on this side has been entirely destroyed. The base of the iris and sinus (Salzmann) of the ciliary body have been destroyed, and in this area, a mass of inflammatory cells, new formed capillaries, broken-down pigment cells, and pigment granules are found. The filtration angle of the opposite side is obliterated by the iris, which is swollen and pushed forward against the cornea for almost 1 mm. distance. The center of the anterior chamber is obliterated. The iris and pupillary membrane come into direct contact with the posterior surface of the cornea; in this portion, the only remnant of the chamber is a shallow, spindle shaped space on either side of the anterior synechia.

On the injured side of the eye, the base of the iris and the corona ciliaris have been ruptured, and the space is filled in with inflammatory cells, which consists chiefly of lymphocytes, plasma cells, fibroblasts and endothelial leucocytes. Degenerated pigmented epithelial cells are seen scattered thruout the inflammatory exudate. The iris structure and processes of the ciliary body have entirely disappeared in this area. The remaining iris on this side corresponds to the central and pupillary portion. In this portion, the anterior surface of the iris is covered by a layer of fibroblasts and new formed fibrous tissue. The anterior border layer is markedly thickened by edema and a moderate infiltration of lymphocytes and plasma cells. The serum and cells have widely separated the supporting fibers and chromatophores. In several places, there are collections of lymphocytes, and polymorphonuclear leucocytes around the blood vessels. Many of the polymorphonuclear leuco-

cytes have pigment granules in their protoplasm. The pigmented epithelium of this portion of the iris has undergone disintegration, and the granules have been set free. The sphincter muscle fibers show cloudy swelling. The pupil is entirely obliterated by an organized pupillary membrane. The iris on the uninjured side of the eye is swollen by edema. There are several nodules of lymphocytic infiltration around the blood vessels. The pigment epithelium has degenerated in some areas and in others is separated from the iris by edema. (Socalled cysts of epithelial layer.) The pigment epithelium of the iris is separated from the lens capsule by a distinct layer of new formed fibrous tissue, which extends backward to the equator of the lens in the region of the ciliary processes. The posterior chamber, on the uninjured side, is entirely filled in with a partially organized exudate, which contains lymphocytes, disorganized pigment cells, and a few polys. The muscular portion of the body is swollen by edema, and in what formerly was the vascular layer, there are nodular masses of lymphocytes with a few endothelial cells in the center of the nodule. The pigment epithelium has entirely disintegrated, and only a wavy mass of disorganized pigment remains. An organized cyclitic membrane surrounds the equatorial portion of the lens. The lens capsule has been ruptured on the injured side of the eye, and the whole equatorial portion of the capsule is absent in this location. The anterior portion of the lens capsule is present; its epithelium has disappeared, and a thick layer of new formed fibrous tissue lines its inner surface. Posterior to this, a few cataractous lens fibers are still adherent to the fibrous tissue. The capsule has retracted posteriorly into numerous folds. On its inner surface, some new formed fibrous tissue and cataractous lens fibers are still adherent. The remainder of the lens substance was lost during cutting and imbedding.

The radial muscle fiber layer and the vascular portion of the pars plana of the ciliary body are markedly swollen by edema.

The whole choroid is edematous, and several nodular collections of infiltrates are seen scattered thru it. These nodular masses vary in size and are made up of scattered collections of loosely arranged endothelial cells, which are surrounded by lymphocytes and a few polymorphonuclear leucocytes. An occasional giant cell is found in the nodules.

The retina is completely detached from the choroid and shows an extreme degree of cloudy swelling and advanced disintegration.

The remaining vitreous cavity is only a small triangular area, extending from the posterior lens capsule to the anterior surface of the detached retina. It is filled with lymphocytes, a few polymorphonuclear leucocytes, and fibroblasts.

Diagnosis. Trauma of the eye with rupture of the sclerocorneal lamellæ at the limbus, and rupture of the base of the iris and ciliary body on the injured side. Rupture of the lens capsule and traumatic cataract. Edema of the cornea and marginal keratitis. Partial obliteration of the anterior chamber, due to swelling of the injured lens. Nodular cyclitis and choroiditis. Detachment of the retina. Early changes of sympathetic ophthalmia.

The above report is a good clinical and pathologic picture of a moderately severe case of sympathetic iridocyclitis. To this might be added that of a second case following a cataract extraction, in which the sympathogenic eye proved eventually to be the better eye. Also a possible third case, or at least a very suggestive case, following a Mules' operation, in which the fellow eye suddenly developed a dimness of vision, slight ciliary injection and a definite blurring of the edges of the optic nerve, all of which promptly cleared up following the removal of the scleral cup and gold ball. These are the only two cases, with the doubtful third, which the author has ever experienced in his own practice, in observing many hundreds of perforating injuries of the eye sustained in the mining and steel industry, and those following operations. To the above,

however, may be added the experience of having closely observed three other cases in the practice of a colleague. Two were elderly patients following cataract operations, and a third, a boy with a perforating wound: in all of these, both eyes were lost.

This experience reflects no doubt, that of most ophthalmic surgeons. One author has stated that an ophthalmic surgeon of average private clientele would probably see five or six cases in an entire life practice. If this be true, and it likely is, sympathetic iridocyclitis, if not rare, certainly is quite unusual. As a matter of fact, it seems likely that the percentage of cases is lessening, either definitely owing to better care, or relatively owing to better classification. The frequency of such cases, relative to the large number of injuries in which the eye capsule is opened, certainly adds a mystifying element to the problem, in view of the fact that undoubtedly many of such injuries are septic. This point, together with the remote interval which sometimes obtains, and also the fact of the occurrence of sympathetic disease sometime after the removal of the injured eye, together with reported cases in which no discoverable wound was present, such as Meller's three cases in which sarcoma of the choroid was observed, leads one to seriously question whether the disturbing agent really always finds entrance at the point of injury. In contemplating these questions, it causes one to speculate as to the possibility of a certain number of reported cases being iridocyclitis coincident with an injury and not necessarily related to, or dependent upon it.

Most text-books state that a prerequisite is that the capsule of the eyeball of the sympathogenic eye must have been opened, either by trauma, ulcer, or following cataract operation. Yet, Meller and others have reported authentic cases, studied histologically, in which the eyeball had not been opened. In Meller's case the eyeball contained a sarcoma. In Bohm's case there was traumatic dislocation of the lens, in which there was no opening of the eye capsule. It seems to the writer, that in these advanced times one should not adhere too strongly to the name sympathetic ophthalmia. The name has been handed down largely owing to our ignorance regarding the specific underlying causative factors.

Schirmer, Rugge and Uhr are credited with first describing the typical histologic findings in sympathetic disease. Fuchs has contributed a large literature on this branch of the subject. In 35 cases examined by Fuchs, in which there were implications of the second eye, the lesions were considered to be typical. These, briefly, are infiltration with mononuclear round cells, epithelioid cells and giant cells. The round cells were probably leucocytes, the epithelioid cells were derived from the normal cells of the uvea, or from the blood vessels, or from the ordinary connective tissue cells, and also from the pigment cells. The specific infiltration in the sympathogenic eye is identical with the one in the eye secondarily affected. The absolute identity of the anatomic picture in the sympathogenic and sympathizing eyes can be explained only on the theory that the same specific agent attacks both eyes. Fuchs believes that the pathologic agent reaches the second eye thru the circulation, because the optic nerves and ciliary nerves show no signs of transmission, while the manner in which the leucocytes invade the walls of the vessels of the ciliary body and choroid of the sympathogenic eye indicates the probability of a metastasis, exactly as this occurs in tumors.

This specificity of the histologic picture of sympathetic ophthalmia, as described by Schirmer and Rugge and later by Fuchs, has been questioned, based upon the absence of these findings in many cases of clinically typical sympathetic ophthalmia. In a series of 200 eyes enucleated for fear of sympathetic inflammation, Fuchs found that only 15% showed the typical findings. Another confusing feature as to the specificity of histologic findings is Botteri's report of a case of idiopathic iridochoroiditis, in which the anatomic examination showed changes in

the uveal tract exactly similar to those described by Fuchs as typical. He also describes in more detail a similar case, which Fuchs has briefly referred to in his original article. He considers the cases give further proof of the fact that a chronic iridocyclitis may show the same histologic picture as sympathetic inflammation, where there has been no perforating injury or involvement of the fellow eye.

Meller endeavors to reconcile these two diametrically opposed opinions by detailing the clinical histories and pathologic findings of seven cases of this type. Very ingenious explanations are offered but nothing convincing, altho he stoutly defends the specificity of the process. Careful study of two of these cases of clinically typical sympathetic ophthalmia, with absolute lack of characteristic histologic findings, led him to the conclusion that a transference of the disease from the sympathogenic to the sympathizing eye may occur before the disease is developed, in a specific sense, in the sympathogenic eye. In other words, the disease is specific only after it has completely developed, while in the initial stages, it may resemble any other chronic uveitis.

There are two principal theories in explanation of the transference of the inflammation from the sympathogenic eye to the sympathizing eye—the nonbacterial and bacterial. The nonbacterial is the cilio-neural theory of Schmidt-Rimpler; irritation of the ciliary nerves causing reflex disturbance of the circulation, thus interfering with proper nutrition of the fellow eye. The optic nerve theory assumes that the inflammatory process is transmitted along the nerve, crossing the chiasm to the fellow eye. These theories do not seem to have gathered a very large following. Of vastly more importance is the bacterial theory. The clinical history, course and pathologic findings all point more strongly toward a solution of the problem by assuming that it is a germ disease. With regard to the path followed or origin of the agent and its exact nature, there is considerable discussion. The mass of literature on the subject is testimony on this point.

Leber and Deutschmann proposed the migratory theory; that is, the passage of the bacteria or agent along the nerve sheath by way of the adjacent lymphatics. To this there are certain unexplained difficulties as, for example, the disease is occasionally observed following removal of the eye or section of the optic nerve; and this at considerable interval in certain instances. Then too, if it followed this course it is difficult to explain the freedom from meningitis.

A more logical bacterial theory, which seems to hold the greatest encouragement for a solution of the problem, is one which comprehends the possibility of an infective agent being recruited from a source either in, or other than the original injury, the agent being conveyed by the general blood and lymph channels. This allows of the possibility of an explanation of the long interval between injury and onset in the sympathizing eye, particularly in cases where the sympathogenic eye has been removed before the onset of the secondary inflammation. It also admits of the possibility of the agent being of endogenous or ectogenous origin.

The metastatic theory proposed by Berlin has been further investigated by Roemer. From the latter's extended study of the subject, he concludes that the only conceivable paths of propagation from one eye to the other, are the lymph channels of the optic nerves and thru the blood of the general circulation. What he regards as the characteristics of the exciting agent is its ability to remain potent in the eye, or body, for a long period, and an inability to harm other organs. There are only two hypotheses that can be drawn from clinical experience concerning its nature; (pathogenic agent) it must be one of the morbific agents that retain their vitality for a long time in the eye and in the organism, for otherwise the long duration of the sympathetic inflammation, its tendency to recurrence, and the fact that it may appear many weeks after

the commencement of the disease in the sympathogenic eye, cannot be explained. It must also be a germ that is not pathogenic to the same degree to other organs of the body as to the eye; indeed it is highly probable that it is not infectious to any other part of the body.

Regarding the type of germ, Deutschmann has suggested a staphylococcic strain owing to its more frequent association with subacute or chronic inflammatory processes. In view of the wide distribution of tubercular infection and its tendency to produce subacute or chronic processes, it is not beyond possibility of its being the offending agent, even if the bacillus has never been recovered from the lesion. To this possibility Meller lends some encouragement in his report of the clinical histories and histologic findings in the eyes of two cases of sympathetic ophthalmia, which showed necrosis in the sympathogenic eyes, the occurrence of which has so far been emphatically denied. In both, iris and ciliary body were supplanted by a tumor of granulation tissue, consisting of nodules of epithelioid cells and numerous giant cells, surrounded by a wall of lymphocytes. The interior of many nodules was filled with detritus, minute granules and lumps of pigment. This necrosis was due to the complete obliteration of the vessels. The tumor extended to the ora serrata, crowding the retina toward the interior. In the parenchyma of the choroid were also nodules of epithelioid cells surrounded by densely accumulated lymphocytes, which farther backward caused a more uniform thickening. The optic disc was very much swollen, a neuritic ridge displacing the retina. The central vessels were surrounded by small celled infiltration, and on the inner surface of the disc was a fibrinous exudation.

Thru the discovery of necrosis in these cases, one of the most important points of discrimination between tuberculosis and the products of sympathetic inflammation has been removed, and the question revived of relation of sympathetic inflammation of the sympathogenic eye to tuberculosis. This is discussed in detail, and answered in the negative by comparing the remaining histologic and clinical data. Tubercle bacilli were never found in the most exuberant uveal exudations, and the numerous attempts of implantations into animals receptive for tuberculosis were not successful. Both diseases have in common that sympathetic ophthalmia has a predilection for children as well as tuberculosis of the iris, which is most frequent up to the sixth year. Either disease has also been observed following injury. Meller states that all this is not sufficient to render a connection of both diseases probable, but that it may permit claiming a bacterial origin of the inflammation in the sympathogenic eye.

From a study of the literature devoted to the subject of sympathetic disease, there are prominent features which not only lend color, but are very convincing that the infection is frequently endogenous. In only a small number of eyes removed for fear of sympathetic disease does a histologic study of these eyes show characteristic anatomic changes. Many of these cases are not followed by inflammatory changes in the fellow eye for years afterward. If we assume the infection entered at the point of injury in these eyes, the process of the exciting inflammation must have been present as a chronic inflammation and should be capable of anatomic demonstration. This, however, is not the case, for frequently at the time of enucleation there is no evidence of a specific inflammation. In injured eyes showing typical inflammation, the transference which usually always occurs takes place in a comparatively short time. Following an injury the eye may develop a soil possessing the proper conditions for an exciting inflammation, which may actually be produced in an endogenous way months or years subsequent. The organism developing in the uvea of the first eye becomes so highly pathogenic that by metastasis the uvea of the sound eye is affected. A further fact in favor of endogenous

inflammation of the sympathizing eye is its occurrence in cases of shrunken or destroyed globes, in which the first diseased eye is clinically absolutely free from irritation and yet the fellow eye develops the disease.

Of other theories which have been suggested, there is the toxin theory of Eversbusch, in which toxic products are transmitted to the second eye, either directly, or by injury of the vasomotor ganglia or by reflex action. The cytotoxic theory is based on the theory of the splitting of the proteins in the uveal tract. This was advanced by Brown Pusey. Perhaps the most promising theory of the biochemic class is anaphylaxis, as put forward by Elschnig and contributed to by Kummell and A. C. Woods. It is a theory relating to the disintegration of inflammatory tissue leading to absorption of uveal tissue, causing a hypersensitiveness of the uvea of the sympathizing eye.

At the recent meeting of the American Ophthalmological Society, Knapp and Woods discussed this phase of our subject. They injected seventeen cases of uveal tract injury with uveal pigment obtained from the immune reaction which followed intraocular injuries. Eleven showed positive complement fixation reaction. These cases healed normally. Four showed negative reactions, one showed clinical malignant sympathetic disease, three sympathetic irritation. The remaining two showed negative reactions. These injured eyes were removed as a precautionary measure. Three cases of old sympathetic disease showed negative reactions. This, however, does not seem to account for the occurrence of the disease years afterward. Neither does it seem to explain why in certain instances the disease is more virulent in the sympathizing eye than the eye originally involved.

Clinical and laboratory observations, as we see, have evolved many theories regarding the occurrence and transference of the disease from one eye to the other. It is more than probable that there are elements of truth in each theory, which, if we were able to fit them together, might offer a solution. The most promising seems to the writer to be the germ theory, either endogenous or ectogenous, with the circulatory system as the path of transference. While it is admitted that certain diseases have a specific cause, yet there are many affections which may have a variety of causes, or at least the source of the infection, or agent, may come from one of several foci. The same focus of infection may be manifested in a variety of ways, in different tissues. In any event, there are few which show onset, development and effect precisely the same. They are modified by many conditions dependent upon individual metabolic characteristics. Having these facts in mind, are we justified, in view of present knowledge, in believing that sympathetic iridocyclitis is an entity, due to one specific cause finding entrance solely at the point of injury? Rather should it not be considered more as a secondary disturbance, due to a local changed metabolism, the source or the agent being in the uveal tract of the sympathogenic eye, or perchance, in some other part of the body.

Possibly there may be a local focus of infection at the point of injury, but can it be successfully stated that this is always the case, and that this focus is always the cause of inflammation in the fellow eye? Injury of a tissue, particularly if there follows a low grade inflammatory process, leaves that tissue more susceptible to bacterial invasion or toxic agents, the resistance having been lowered. It is conceivable that bacteria may enter the globe at the time of injury, remaining resident and more or less quiescent for an indefinite period. This is likely true in a certain number of cases, but it is equally conceivable that injury to the uveal tissue prepares a fertile soil for bacterial invasion from other foci of infection. The resulting products of this invasion finds elements in the fellow eye for which it possesses a definite affinity, the severity of the attack being in accord with its virulence. This

seems true particularly in instances where long intervals are recorded between the injury and onset of sympathetic iridocyclitis.

The fact that in certain cases even following enucleation, at more or less remote times, sympathetic iridocyclitis is established, seems to indicate, at least, that while we may grant the influence of the injured eye in possibly establishing a low grade inflammatory process, or possibly preparing the soil in the fellow eye, the continuance and increasing severity some time after enucleation are more than significant that the "fire" is being fed from another source. This may be from a small apical tooth abscess containing perhaps a strain of staphyloccoci, with special affinity for uveal tissue, rendered so by the influence of the original injured uveal tissue. The numerous relapses which sometimes occur during the course of the disease may be accounted for in the same way.

In this connection it is well to consider the possibility that, even if an eye has undergone an attack of sympathetic iridocyclitis with recovery, subsequent inflammatory relapses may be the result of entirely different causes, and in no way dependent upon the original inflammation, except in so far that an uveal inflammation renders the eye more subject to subsequent inflammation, the exciting cause being in no way related to the original cause.

Crediting enucleation, in a given case, as the means of having saved the fellow eye, seems to the writer difficult to prove. We remove an eye, believing it to be a menace, yet, in anticipating danger we have no clinical or laboratory means of definitely knowing. If the inflammatory changes have once become established in the fellow eye, and the inflammatory process in the sympathogenic eye not so severe as to anticipate complete destruction, and the sight previously servicable and not greatly reduced, such an eye should not be enucleated. It may prove to be the more serviceable.

It is difficult to believe that the causative agent of sympathetic iridocyclitis is always resident in the sympathogenic eye alone, and that it is the sole etiologic factor to be considered in accounting for the changes in its fellow. If it were, how can those cases be explained in which useful vision is retained in the sympathogenic eye, and yet the sympathizing eye is lost? It seems reasonable to believe, that, if the agent is virulent enough to destroy the sympathizing eye, surely it would produce a like result in the sympathogenic eye, especially in view of the fact that its uveal tissue has already been damaged. Yet, this very fact leads us to consider a possible explanation in assuming that it is an anaphylactic reaction contributed to by infection from various focal points. At the time of the injury, the injured uveal tract gradually develops a degree of immunity, thus lessening the severity of the attack in the sympathogenic eye, while in the sympathizing eye invasion takes place before the eye has had an opportunity to establish any degree of immunity, thus permitting a much more severe attack.

The case history cited at the beginning of this contribution seems to point strongly to the belief that the real infection emanated from the unhygienic oral state, the injury acting as the determining factor in producing a soil suitable for the propagation and development of bacteria having an affinity for uveal tissue, the pathogenicity increasing until the noxa attacks the fellow eye. In the matter of therapeutic measures instituted, certainly not any were consistently carried out, save that of thoroly cleansing the oral cavity.

TRACHOMA AND OUR END RESULTS.

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The writer believes that trachoma includes many forms of conjunctival inflammation and certain results produced. These results include especially hyalin degeneration and cicatricial deformity of the tarsus. The treatment of acute cases should be soothing. When deformity of the lids has occurred. he prefers the slicing down of the tarsus from the outer surface as recommended by Cary. Read before the Texas State Medical Association, May, 1922.

I am minded of the fact, that to differ with an accepted theory is thought by some to be medical heresy. I am also minded of the fact that medical precedent hunters have not made medical history. The views expressed in this paper open a new line of thought concerning this disease.

The points I wish to stress are, first; that trachoma is not a disease entity. Second; this disease as we see it, is a symptom complex, the result of any bacterial infection of the conjunctiva. Third; it is the duty of ophthalmologists to standardize diagnosis as much as possible for the benefit of the school physician, the public health nurse, and the laity.

The essential element of the cause of trachoma bodies is no nearer a solution than it was before the advent of the microscope. The two views held which are entitled to consideration are: first, that they are new growths of special pathologic character; second, that they are natural lymphatic follicles, and their changes are due to repeated attacks of inflammation.

I have always looked with suspicion upon any diagnosis that was not founded on fact. That the disease is of microbic origin has not been proven. In the absence of this proof I have come to the conclusion, after a long and varied experience with trachoma as we see it, that the changes in the lid are due to repeated attacks of inflammation and not to a specific trachoma infection.

I am of the opinion that the socalled second and third stages of trachoma are not due to a morbific agent, but due to amyloid degeneration from chronic inflammatory changes in the tarsus. The final stage of this disease, cicatrization, is best described by de Schweinitz who says, "By a gradual process of cicatrization of the old granulations, and successive cicatrization of new crops, a chronic induration and diffuse scar tissue results; this being attached to the tarsus, which itself has undergone softening thru lymphoid infiltration, contracts and the deformity of the lid so common in this disease results." It is to this softening and later contracting of the tarsal cartilage that I wish to call your attention.

I believe that any specific infection of the palpebral conjunctiva, if allowed to become chronic, either thru bad treatment or neglect, will produce a low inflammation in the tarsus and produce permanent changes in that structure.

I would call your attention to the structure of cartilage. It has a semi-opaque, nonvascular tissue base, the matrix of which contains nucleated cells which lie in cavities or lacunæ of the structure.

Prolonged inflammation of the conjunctiva from any infection, due to continuity of tissue, must inflame the tarsus, producing chondritis, which is followed by a shrinking and distortion of the cartilage. In the early stages of chondritis we have the thickening of the lid and the presence of organized nodules known as trachoma bodies imbedded in the tarsus; this condition is not due to specific infection, but to inflammation.

The different varieties of granulations are described according to the different stages of inflammation and to the clinical picture found at the date of examination. Papillary trachoma, follicular trachoma, mixed trachoma, acute granulations, chronic granulations. Examine your patient and take your choice as to nomenclature. Acute trachoma, viewed from a purely clini-

cal standpoint, I must admit I have never been able to diagnose as such.

The clinical picture of socalled trachoma is identical with any acute granular disease of the conjunctiva from whatever cause. I find the same difficulty of diagnosis is experienced by most men with whom I talk; as one tersely expressed it, "When acute granulations get well, they are not trachomatous, when they don't they are." He should have said when acute granulations get well the tarsus has not become involved, when it has they don't.

The chaotic state in which we find ourselves in diagnosing granulations of the conjunctiva, is a reproach to our specialty. It is incumbent upon us to give the cause of the condition; this can only be done by painstaking care. The microscope should be used much oftener to determine the offending organism; it is not enough to evert the lid and gravely give the diagnosis of granulated lids or trachoma.

Is it any wonder that the school nurse or school physician should be guilty of this, if we ourselves are guilty? We all know the great injustice often done to children from such a diagnosis; in loss of time from school, and financial loss to the parents for useless surgery and treatment for the cure of follicular conjunctivitis.

TREATMENT.

Treatment should be considered from two viewpoints, acute and chronic. In the acute or primary stage, every effort should be made to determine the kind of infection you are dealing with, and appropriate remedies used to stop infection. It is my custom in acute inflammations of the conjunctiva to use strong astringents and mild antiseptics, the removal of all sources of irritation, i. e. to prohibit the use of the eyes for work, this to eliminate eyestrain, the use of colored glasses to prevent irritation from light and dust, the frequent application of cold compresses, and the instillation of a weak solution of atropin to relieve ciliary congestion; in fact to use any remedy which will assist in allaying inflammation and prevent it from becoming chronic. The careful handling in this stage, in my opinion, will often prevent the development of the second and third stages, chondritis.

Under the best of conditions, chondritis is a tedious disease to treat and relapse may be frequent; but greater success will attend this line of treatment than any other I have tried. I am firmly convinced that caustics, such as copper crystal, phenol solutions and strong bichlorid solutions or, 'grattage" whether the instrument used be forceps or roller, should never be used in acute infections of the conjunctiva.

The object of our treatment should be the prevention of scar tissue and not the formation of it. I believe the administration of alteratives and tonics during acute inflammatory conjunctival infection will promote resolution.

If your case is first seen in the degenerative stage, and cicatrization with the formation of scar tissue has already begun, your treatment can only be surgical and it is the end results of surgical measures I wish especially to discuss.

The earlier methods of operating upon trachomatous lids were the use of some form of "grattage," brushing with a stiff brush; or the use of instruments devised to express the granulations. The two most frequently used are the hollow forceps devised by Noyes, and the roller forceps of Knapp. The object of "grattage" was to promote resolution by squeezing out the socalled trachomatous bodies. This line of treatment, will in a certain percentage of cases give excellent results, provided there has been no definite changes in the shape of the tarsal cartilage. The greatest good, however, that results from "grattage," after a chondritis has developed, is that it hastens the stage of cicatrization and prepares the lid for more radical measures, saving the patient much time and suffering.

The object of all radical operative procedures upon trachomatous lids is the removal of the pathology caused by chronic inflammation, and as most

of the change has occurred in the tarsal cartilage, operations upon this structure are most frequent.

Tarsectomy is done by everting the upper lid, placing the distorted and buckled cartilage on the stretch and held in position by means of a spatula. A sharp scalpel is then boldly passed thru the entire thickness of the cartilage along its entire length, it is then severed from its attachments and removed in its entirety. The denuded lid is then covered by drawing down the retrotarsal folds and sewing them to the lid.

The different modifications of tarsectomy are as varied as are the men doing them. I believe, however, that most operators have abandoned the stitching of the conjunctiva for the reason that it occasionally produces a deformity of the lid and is also likely to prevent the correction of the existing entropion. My own experience has been that the cases do better that are not stitched, but in these you may get some conjunctival adhesions to the eyeball.

Several years ago at a meeting of the State Medical Association, Dr. Cary of Dallas read a paper before our section describing an operation he was doing upon the tarsus, which for want of a better term I shall call "tarsotomy" to differentiate it from tarsectomy, which we all know. At the time the doctor read his paper, I must admit I did not get a very clear idea of his technic, but afterward I had the pleasure of seeing him operate, and was so much impressed with its mechanical possibilities, that I have used it to the exclusion of all other operations and my results have been much better.

This operation, unlike tarslectomy, is done upon the outside of the lid. The first step is the application of a large chalazion forceps to protect the eyeball and to control hemorrhage. Thru the fenestrated opening above, the skin is incised the entire length of the lid and parallel to its free margin, this incision exposes the fibers of the orbicularis muscle; the skin and muscle are then freed downward to the margin of the lid and upward to the extreme upper border of the tarsus, in this manner the entire tarsus is exposed. After the muscle is separated, its fibers are grasped with forceps and removed with scissors. In most cases the exposed tarsus will be found to be unusually thick and curved convexly forward.

The tarsus is now removed in thin slices, by the use of a very sharp scalpel held flat against the convex anterior surface of the thickened tarsus. The success of the operation depends upon the thoroness with which this is done. There is little danger of cutting thru, but no harm is done if this accident should occur; the margin of the lid is left intact. After the tarsus is thoroly straightened, the wound is closed with only a skin suture, a light dressing is now applied, to be changed the following day, and the stitches removed on the fourth day.

The advantages of this operation over others are: (1) you do not get a deformity of the lid; (2) conjunctival adhesions are prevented; (3), you have no granulating wound; (4), involvement of the cornea after operation is not nearly so likely; and, (5), relapses are far less frequent. I wish, after a thoro trial, to commend this operation as being a distinct advance in tarsal surgery.

In conclusion I wish to quote an old adage: "That a prophet is never without honor, save in his own country," and venture the opinion, that if this operation had been perfected by some ophthalmologist with an unpronounceable name from Central Europe he would have many advocates among us.

NOTES, CASES AND INSTRUMENTS

CASE OF PULSATING EXOPHTHALMOS.

RALPH A. FENTON, A.B., M.D.

PORTLAND, OREGON.

The following cured case of pulsating exophthalmos was exhibited at the May meeting of the Oregon Academy of Ophthalmology and Otolaryngology:

Miss E. M., 24, received a blow on the angle of the right lower jaw ten months ago; she lay senseless for a time, and was aware of a loud rushing tinnitus in the right ear on awakening. The only external evidence of injury was a slight skin bruise. The ear noises caused her to visit Dr. C. C. Wilcox, for whom we examined her, a week after the injury.

At this time there was no exophthalmos, but diplopia from right IV. paresis; vision O. U. 20/20. Tinnitus was increasing, of a throbbing character; there was no tympanic or intraocular abnormality. Diagnosis of probable traumatic cavernous-carotid aneurysm (right) was made. The patient left observation for three weeks. At the later date, a month from the injury, exophthalmos and venous congestion had begun in the right eye: V. O. D. 20/30, O. S. 20/30. A distinct bruit was audible over the right zygoma with the stethoscope. Tinnitus had increased to a degree that prevented sleep. There had been 20 pounds loss of weight.

The patient was returned to Dr. Wilcox with the suggestion that the right carotid be tied unless digital compression gave immediate relief. She did not follow orders, but left the city, falling into the hands of a chiropractor, whose "adjustments" were made in spite of increasing exophthalmos, paralysis of the right III., IV., and V., and what is described as corneal anesthesia and bullous keratitis lasting several weeks.

When next seen, five months after the injury, both eyes protruded and pulsated under the finger; V. O. D. 20/70, O. S. 20/30. A caput medusae of huge veins encircled both corneae. The aneurysmal bruit was audible to the unaided ear at four inches from the right zygoma. Media were clear; there was only slight broadening of the retinal veins. Lateral excursion of both eyes was much limited, and diplopia was constant. There had been a total loss in weight of fifty pounds. Immediate operation was again recommended. The patient did not, however, return to the care of Dr. Wilcox for three months more, eight months after the injury, in a most hopeless and unhappy mental state.

Ligation of the right internal carotid—a most difficult procedure—was performed a few days later, using four ligatures, applied so as to cause slowing of the current and thrombotic occlusion over a considerable length of vessel wall.

The patient awoke to find her head noises completely gone; diplopia disappeared in four days, a slight mydriasis persisting for several weeks. Exophthalmos and venous dilatation have gone down to less than a third of that seen prior to the ligation. No bruit is heard over the zygoma. Vision in ten days was 20/30 O. D., 20/40 O. S.; in a month 20/20-2 O. D., 20/30 O. S. There is some hyperopia and convergence insufficiency, corrected by glasses. The gain in weight of fifteen pounds reflects a complete change in mental attitude and justifies the wisdom of Dr. Wilcox in tying off the internal carotid rather than the easier common trunk, with its possibilities in the way of cerebral ischemia.

CHANGES IN REFRACTION.

HARRY FRIEDENWALD.

BALTIMORE.

Marked and rapid changes of refraction are observed in a variety of ocular diseases (developing cataract, glaucoma, cyclitis, etc.), and as a consequence of too sudden withdrawal of food in diabetes. But the case which the writer reports is unique in his experience and he has been unable to find

any reference to a similar one in medical literature.

Mr. I. H., aged 43, was first seen July 18, 1913, complaining of some difficulty in near vision. His eyegrounds were normal and his distant vision perfect, 20/12+ in each eye (some of 20/9 and 20/7.5). He accepts +0.25 D. C. in the right eye, but no plus glass in the left. R. E. +0.5, L. E. +0.25 were ordered for reading.

He returned Sept. 28, 1914; condition unchanged except that neither eye accepted plus glasses, and that +0.75 was required for each eye for reading.

In Sept., 1915, and in Jan., 1917, he returned, the examinations of the eyegrounds showing normal conditions and central vision unchanged. +1.25 D. S. was ordered in 1915, +1.5 in 1917.

December, 1919, the same conditions were found, and +2. D. S. was found necessary for reading.

The patient returned July 8, 1921, complaining of pain in the right eye during the past two days, with some discomfort in the left: sudden movements are painful. There was a small patch of slight episcleritis in the right eye. The pupils were equal in size, the eyegrounds normal. Hot applications were applied. The affection was so mild that no other treatment was deemed necessary.

On July 11, the congestion had disappeared, there was still some edema of the conjunctiva and at time some pain.

July 18. All signs of inflammation have disappeared, but there is still pain in and around the right eye. Eyegrounds and tension normal. An examination of the central vision showed R. E. 20/96, 20/76 doubtful, +2.= 20/12, L. E. 20/12 accepts +0.5. These glasses were ordered with the object of relieving the discomfort of which the patient was complaining, and +2. additional were given for reading.

The patient returned on July 22. With the correcting glasses the vision of the right eye had fallen to 20/24 and +2.5 was required to bring vision up to normal. This glass was ordered. On account of the rapid changes in the refraction the urine was examined and found normal.

July 30. The hyperopia of the right eye had again become reduced to +2.

Aug. 21, the patient returned stating that the condition had changed again and V. was found R. E. 20/19 +0.75 20/12, L. E. 20/12 +0.5 accepted. The patient feels now quite comfortable without glasses. With +2.5 each eye reads finest print with equal ease.

Inquiry now showed that the dentist Dr. A. C. Brewer had, by X-ray examination, found an abscess in a lower molar tooth. This was extracted on Aug. 7. The patient was convinced that the improvement in the condition of his eyes followed directly after the removal of the tooth, but it must be noted that a week before the extraction there was a slight lessening of the hyperopia.

On May 31, 1922, vision of both eyes was equal (20/12), each eye accepting +0.50; the near points of both eyes were alike. The patient has remained perfectly well.

In this case the affection was monocular. It is to be noted that the rapid increase of hyperopia of about 1.75 D. was observed about a week after the occurrence of what was looked upon as a mild and rapidly disappearing episcleritis. The hyperopia continued to mount and four days later the increase was 2.25 D.; eight days later the hyperopia had again diminished 0.5 D. and after a further period of three weeks it had almost returned to the normal condition. During the entire period, the accommodation did not vary in the two eyes.

It may be suggested that there was possibly a cyclitis accompanying the episcleritis, but there was no evidence of this, either in the vitreous or on the posterior surface of the cornea.

The writer does not venture to explain the case. The relation between the eye affection and the tooth may be simply coincidence. Still, in the absence of any satisfactory explanation, the fact dare not be brushed aside without consideration.

CENTRAL SCOTOMA WITH PYORRHEA.

A. G. Hovde, M.D.

SUPERIOR, WISCONSIN.

Mrs. R. E., aged 40, feeble, occupation housewife. Referred January 21, 1921 to have glasses fitted. Has noticed a gradual failing of her sight the last three or four months, and lately she has had some pain in the eyes. Pupils probably slightly dilated (3.5 mm.); react to light and accommodation. Cornea, iris and anterior chamber normal. The lens also appears clear.

At the trial case, R. vision 1/10; L. 3/10. No lenses could be found to improve the vision in either eye.

The media were clear in both eyes. The fundi appeared normal with the exception that the outer upper quadrant of the papillæ seemed rather pale in color.

Peripheral fields normal. Small central scotoma for green and red. The size of the green test object was 2 mm., which in one position was called white. The moment the test object was moved to either side its color was recognized. The red test object in the same position was called brown.

Diagnosis: Toxic Amblyopia.

Further General Examination: I questioned her if she had been taking any medicine, patent or otherwise, and she said no. The same reply she gave to my question if she had been drinking any liquor. My quiz did not reveal any suggestion as to the cause. Examination of throat, nose and accessory nasal sinuses was negative, but she did have a very exaggerated pyorrhea alveolaris. Many of the teeth were practically standing in a pool of pus, surrounded with necrotic tissue. I could think of this only as a remotely possible cause of this patient's toxic amblyopia, and determined to hunt further. I commented upon the poor condition of her teeth and gums, but did not suggest to the patient that this might be the cause.

Since the doctor who referred the patient to me thought that only glasses were necessary to bring back her sight, I sent her back to him for a general physical examination, stating to her that I found some condition of the optic nerve which glasses could not correct, and that we must try to determine its cause.

I called up her doctor and explained to him the situation and urged him to be on the lookout for anything that would lead to a diagnosis. The patient did not return to me until March 10th, when she called, she said, to thank me for my thoughtfulness in pointing out to her what was doing harm to her eyes. She told me that she realized that I was much impressed with the bad condition of her teeth, and she went right to her dentist and had them all removed. Her vision has been improving ever since.

At the trial case, she now reads 8/10 right and left without any faltering. The color of the papillae is not so pale as it appeared previously. There is no central scotoma of any kind.

Discussion. Since no treatment except the dental extraction was administered, we can only suppose that this patient was overwhelmed with the toxin from the bacterial activity and necrotic processes around her teeth.

Hysteria, of course, might have simulated the condition, but she was hardly well enough informed to check up so thoroly with the symptoms of toxic amblyopia. Nor did she look like she was addicted to the use of liquor, and she had no odor of tobacco about her. It is possible, of course, that the patient may have been taking some brand of alcoholic mixture continuously, and from this produce the toxic amblyopia; but even so, complete cessation from its use would hardly bring about so quick a recovery.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE.

Section on Ophthalmology.

Clinical meeting of Friday, June 9, 1922.

Sir John H. Parsons, F.R.S., Chairman.

Mass Obscuring Optic Disc.

Mr. J. F. Cunningham showed the patient. Even under the best conditions, the mass could be seen only indefinitely; it involved the disc in its lower part. He thought it was possibly of congenital origin, tho it might have followed upon some trauma.

Discussion. — Sir John Parsons thought it more likely that it was a congenital film, due to an excess of fibrous tissue on the disc, than that it was ordinary retinitis proliferans.

Symmetric Swelling of Lids.

Mr. Doyne exhibited a case. As the patient was an inmate of a mental hospital, there might be doubt about the history he gave. There were symmetric swellings toward the outer margin of the upper lid, in both eyes. The patient himself said they had been there ever since birth, and that they had undergone no appreciable change in size. At first he regarded it as a dermoid, but felt sceptical about that later, because on pressure it gave a sensation of lobulation, such as from a lipoma. He asked for opinions.

Discussion. — Mr. J. B. Lawford thought cystic swellings could be excluded. Under pressure the tumors receded very readily, so that it was difficult to make out their outlines with the finger tips. And against the idea of dermoid was the fact of the swelling having been stationary in size for forty years; he believed orbital or extra-orbital dermoids were never stationary, some grew quite rapidly. In his view, the diagnosis lay between symmetric fatty swellings and a soft form of congenital hydroma. Their extreme softness favored the former view.

Mr. Malcolm Hepburn thought the possibility of it being lacrimal gland should be considered.

Sir John Parsons said the swellings apparently were similar to those frequently seen in the inner part of the upper lids in elderly people, which were generally recognized as being due to orbital fat coming thru the opening in the facial septum. He was unfamiliar with such swellings in the outer part of the upper lids.

Models for Prothesis.

Mr. Oliver showed some beautifully executed models for prothesis.

Sir John Parsons said these models showed that the work had been brought to the pitch of a very fine art.

Detachment of Retina.

Mr. H. R. Jeremy exhibited a woman, aged 38, who had a retinal detachment at the macula. A fortnight ago, she attended hospital and stated that she had been unable to see with the left eye for two years. When eight years of age, she was struck in that eye with a stone. At times the eye was painful. A fortnight ago she could perceive fingers at the periphery of the field, and now there was only perception of shadows there. The tension of the eye was not raised, there was no conjunctivitis or circumcorneal congestion, and the cornea was clear. There were, however, a few fine vitreous opacities. The disc was normal. There was a detachment of the retina at the macula, ovoid and regular in shape, greyish-white in color, and the surface was smooth. A fortnight ago the detachment was 4 or 5 discs in diameter, the edges were regular, and there was choroidal pigmentation below. The tension was raised, plus 8 to plus 10. Wassermann reaction was negative. He had advised having the eye removed, but thought he would like opinions of members first.

Discussion.—Sir John Parsons said that if the detachment started in the macula it was a long history (two years).

He referred to a case which was under the care of the late Mr. Marcus Gunn, in which a tiny tumor in the macular region manifested itself at an early stage in the history by a disturbance of the central vision. Examination showed, in the lower part of the fundus, a large simple detachment of the retina, separated from a very shallow detachment just over the growth.

During the meeting, congratulations were offered to Sir Richard Cruise on the honor just conferred on him by his Majesty in creating him a Knight of the Royal Victorian Order.

H. DICKINSON.

COLORADO OPHTHALMOLOGICAL SOCIETY.

April 15, 1922.

DR. C. O. EIGLER presiding.

Multiple Ocular Diseases in Same Patient.

F. R. SPENCER and C. L. LARUE, Boulder, presented a man, aged seventy-two years, who had a variety of ocular disturbances. He had come on April 6, 1922, complaining of a dull pain in the left eye and of blurring of near and distant vision. He said the vision had failed rather suddenly in the past few weeks. The vision was R. 6/20, L. 6/60. There was a large pterygium on each eye. The eyes were noticeably convergent. There was some cortical opacity and a slight general haziness of each lens. Each vitreous contained a few large floaters. The periphery of each fundus showed several fair sized areas of chorioretinitis. Tested with the colored lens there was constant diplopia. Correction did not markedly improve vision. After transplantation of the pterygia, correction gave vision of R. 6/7, L. 6/12.

Discussion. EDWARD JACKSON, Denver. The choroidal change is old and there is comparatively little atrophy for the amount of pigment deposit. The old choroiditis probably had little to do with the recent change in vision.

Coloboma of Iris and Choroid; Retinal Detachment.

W. T. BRINTON, Denver, (by invitation) presented a young man, aged eighteen years, whose right eye had a congenital coloboma of the iris. The vision of that eye had always been poor. Two weeks previously he had suddenly noticed that the vision of this eye became blurred, and that he was unable to see objects to the left of the middle line. On examination the vision of the affected eye had been 16/200, that of the left eye 16/16. The coloboma was found also to involve the choroid, and there was a temporal detachment of the retina extending backward from the periphery, obscuring the disc, and involving about a half of the fundus. There was heterochromia iridis. Contrary to advice the patient had recently engaged in a boxing match, and he had suffered a hemorrhage into the vitreous which reduced the vision of the right eye to light perception, and left numerous floating opacities in the vitreous. A Wassermann test was negative, as was examination of the teeth and sinuses.

Discussion. EDWARD JACKSON, Denver. I have never before seen detachment of the retina in a case of choroidal coloboma. This does not look like an injured eye, and I should rather think of a new growth. The retina seems to be adherent over the coloboma. The detachment apparently covers the optic disc. The detachment may have come on very gradually and may have been unnoticed until it involved the macula.

G. L. STRADER, Cheyenne, Wyoming. Dr. Gifford feels that all detachments due to new growths are the result of injury, altho in many cases they may come on gradually and date back a good while, even occasionally to an injury several years previous.

C. L. LARUE, Boulder, referred to the case of a man who, while in the S. A. T. C., four years previously, had received a blow on the eye from an apple, and who said that the vision of this eye had not fallen for a long time after the blow was received, but who had recently come in with complete detachment of the retina.

Lethargic Encephalitis.

W. H. CRISP, Denver, reported two cases of abducens paralysis, one definitely symptomatic of lethargic encephalitis, the other of uncertain causa-

tion. The first case was in a young woman aged nineteen years. She had complained of headache for about two weeks, but the only other pronounced symptoms were dilatation of the right pupil, and diplopia associated with convergence of the right eye. The vision was unaffected, the right pupil reacted very slightly to light, the accommodation of this eye being, however, unaffected, and the movement of the right eye outward was retarded before the median line was reached, and stopped entirely at the median line. The patient had not been markedly lethargic, but answered questions very briefly. Drowsiness was not pronounced. For a time doubt was thrown upon a diagnosis of lethargic encephalitis because of the extremely frank and almost steady character of the ocular disturbances. But every other line of investigation, including a Wassermann test, proved negative, and the latter course of the disease was slightly more characteristic of lethargic encephalitis, altho practically no other local symptoms developed. There was very doubtful elevation of the right optic disc, but the patient was rather highly hyperopic.

The second case was in a man, aged twenty-one years, who stated that he had been seeing double for about six weeks. This ocular disturbance had begun about the time he got up from a febrile attack, during which the temperature had been for part of the time 103 degrees, and which was accompanied by a marked desquammative eruption on the legs below the knees and on the wrists and hands. The eruptive condition had since been readily diagnosed by two Denver dermatologists as erythema multiforme. There was a doubtful clinical history of syphilis, but repeated Wassermann tests, including one made since the patient came to Dr. Crisp, had been negative. The patient saw double only when he looked to the left, and in direct gaze the convergence measured only 14 centrads; there being apparently a rather moderate weakness of the left abducens muscle. In spite of the negative Wassermann, mercury inunctions and potassium iodid had been ordered. A week later the muscular weakness had improved more than 50 per cent, but the patient announced that for financial reasons he had not used any medicine. Since erythema multiforme was always symptomatic of a severe underlying condition, the question arose what the underlying condition might have been in this case, and what was its connection with the ocular paralysis.

Discussion. Edward Jackson, Denver. There is a possibility that this second patient had an unusual form of lethargic encephalitis. To-day I saw a case in which the disturbance began fifteen months ago. I saw the man about a year ago, when he had complete abducens paralysis of both eyes. He went on for three or four months without any improvement. In the latter part of the summer, I noticed a distinct outward movement in one eye, and now he has outward movement of 15 or 20 degrees in this eye. A week ago I found distinct outward movement of the other eye, and to-day I found the movement in the second eye distinctly increased. He has been going thru some exercises. I do not expect him to recover entirely, and he may need an operation, but as long as he is improving I shall not advise this. I believe the case was one of lethargic encephalitis.

W. H. Crisp said that he had considered the possibility that his second patient had suffered from lethargic encephalitis of exceptional form.

W. F. Matson, Denver, wondered whether the case might have been one of scarlet fever in spite of the lack of eruption on the body and face.

E. E. McKeown, Denver. I recently had a case of mastoid operation on a girl of six years, in whom it was necessary to tie off the jugular vein. She slept for five days after the operation on the left ear, and the right eye became affected. She was completely unable to abduct this eye. Four days later a similar disturbance developed in the left eye. The right eye began to return to normal after three weeks, but the left eye is still slightly paralyzed. The Wassermann test and all other tests and studies were negative. There was no evidence of facial paralysis on either side.

Wm. H. Crisp, Secretary.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY.

Dr. Hilliard Wood, President.

May 15, 1922.

Laceration of Nasal Duct.

Dr. M. C. Cullom reported the case of L. R., white, female, aet. 26, who on May 8, 1922 presented herself at his office with an injury to the left lower lid, due to accidental blow from the heel of a shoe at inner canthus of left eye. Examination showed a tear of the

Fig. 1.—Laceration of nasal duct with probe placed in it. (Cullom's case).

lower lid extending along the fornix internally, and along the infraorbital margin externally for about one inch; the tear was completely thru skin, muscle and mucous membrane; the tear duct was torn thru completely.

Patient was removed to the hospital and repair of injury undertaken, the object being to preserve, if possible, a patulous tear duct. In pursuance of this, Bowman's lacrimal probe No. 1 was passed thru the inferior canaliculus, and then thru the tear into the lacrimal sac, and then down thru the lacrimal canal. This approximated the torn surfaces perfectly. The edges were sutured with interrupted silk sutures and the eye dressed with probe in place. The probe was allowed to remain in place one week, at the end of which time it was removed, along with the sutures. The cosmetic effect was good, and the patient seems to have a perfectly functioning duct.

Pulsating Exophthalmos—Report of a Case.

Dr. J. Leslie Bryan reported the case of R. S., male, aet. 5, referred to him February, 1921, to ascertain the cause of distended veins in the eyelids. History: No serious illness; no injury; patient eats and sleeps well; plays out-of-doors continually. Examination: Well nourished, well formed boy, except a peculiar shaped head. X-ray of frontal sinuses, antra, ethmoids, sphenoids and mastoids negative. Urinalysis and Wassermann negative. Nose negative. Tonsils hypertrophied and diseased. Ears normal. Vision each eye 15/15. Eyes slightly bulging; veins of upper and lower lids of both eyes and temporal regions distended; no pulsations; no bruit at this time, but bruit appeared in a few weeks, and was marked, being heard over any part of the head without use of stethoscope. Conjunctiva, sclera and cornea clear; iris normal; reactions normal; lens and media clear. Ophthalmoscopic examination showed marked neuroretinitis, a typical choked disc, such as is often found in cases of brain tumor; this was binocular. No hemorrhages, no pain, no interference with motility of ocular muscles. Fields normal.

A positive diagnosis was not made until the case was seen for a second time. The doctors all agreed that the administration of increasing doses of potassium iodid was the proper treatment. This was carried out over a period of time without beneficial results. Later a ligation of the left common carotid was done, without relief. Last fall a resection of the superior ophthalmic vein was done on the left eye, a Killian incision was made, the resection being made thru the upper and inner angles of the orbit. This had no beneficial effect on the condition, the result being that the eye was displaced outward and downward, the distension of veins and of the lids was increased, and the veins of the conjunctiva were engorged. When last seen the optic nerves gave the appearance of

beginning atrophy. The father was advised to consult Dr. de Schweinitz.

Dr. Bryan said, that in searching the literature at his command he had found very little with reference to this condition except in the text books, the most concise and comprehensible description being found in the 9th edition of de Schweinitz.

Discussion. Dr. Hilliard Wood said that when he saw the patient May 23, 1921, there was a distinct bruit heard all over the head, most distinct in front. Bruit was not abolished by pressing on either common carotid, but was abolished by pressing on both common carotids at the same time.

Paralysis of Divergence.

Dr. Robert J. Warner reported two cases as follows:

Case 1. J. M., aet. 56, male, complained of double vision past week. Examination shows vision of each eye 20/40; with +1.50 D. S., V.= 20/20; +4.00 for reading. Cornea, sclera, pupillary reaction and fundus each eye negative. Homonymous diplopia and convergent strabismus at 20 feet, single vision with a 20 degree prism, base out; without prism the diplopia decreased as object approached till single vision at 2 feet. Diplopia same in all fields. Blood Wassermann 4 plus. Patient put on salvarsan and mixed treatment. Eye examination three weeks later showed no change.

Case 2. M. P., aet. 38, female. Complaint of double vision for past three days. Examination showed vision each eye 20/15. Cornea, sclera, pupillary reaction and fundus each eye negative. Homonymous diplopia and convergent strabismus at 20 feet; single vision with a 20° prism, base out. Without the prism, the diplopia decreases as the object approaches the eye till single vision at one foot. Diplopia same in all fields. Urinalysis and blood Wassermann negative. Spinal Wassermann requested. Diagnosis of sleeping sickness made by Dr. Witt.

Paralysis of divergence is a rare condition. It is characterized by convergent squint and homonymous diplopia, decreasing as an object approaches the patient, till a certain point is reached, where there may be single vision, while within this limit there may be exophoria. The squint and diplopia remain the same as the eyes are carried to the right or to the left, and this point alone differentiates this condition from a paralysis of abducens, in which the diplopia increases on looking to the right or to the left.

The condition usually develops suddenly, occurs in all ages, and more often in hyperopes than myopes. As to cause, cerebral hemorrhage, nephritis, with high tension, tabes dorsalis, and multiple sclerosis are given. The exact location of the divergent center is unknown, but it is thought to be at the base of the sixth nuclei, at the floor of the fourth ventricle, near the nuclei of the seventh nerve.

Discussion. Dr. Fred E. Hasty said that in the majority of cases of sleeping sickness he had observed, the eye complications are usually first those of the muscles supplied by the third nerve.

Dr. E. B. Cayce reported two cases of sleeping sickness in which muscle disturbances were the first symptoms to be observed. In both cases the muscle trouble subsided after the disease had run its course.

MEMPHIS SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

June 13, 1922.

Foreign Body in the Orbit.

Dr. A. C. Lewis reported the case of Mr. J. B., who, on April 2nd, 1922, removed the cap from a 38 pistol cartridge, laid it on a stone and struck it with an iron rod. It exploded and struck him in right eye, cut thru upper lid at the margin and removed a large semicircular piece of it. The cap penetrated the bulbar conjunctiva and Tenon's capsule about 1 cm. from the nasal limbus, and just above the tendon of the internal rectus muscle. The X-ray showed it well back in the orbit lying over the ethmoid region. After enlarging the wound of entrance the cap was easily removed with a small strabismus hook and a pair of forceps. The lid segment was still in it.

Improvement was prompt and uninterrupted, and promised to be complete until April 20th, when patient complained of vision in this eye getting dim. The vitreous was cloudy and contained numerous large floaters. This has gradually cleared up, and his vision is now equal to 20/20ths. With the ophthalmoscope one can still see a black pigmented area in the retina, on the nasal side near the periphery.

The copper cap and lid segment are here for inspection.

Discussion.—Dr. Ellett referred to a patient shown to the Society with a similar nonpenetrating injury to the eye from bird-shot. Subsequently the retina detached, and there is now complete atrophy of the iris and a blind and shrinking eye. The prognosis in these cases should therefore be very guarded.

Iritis and Cataract.

Dr. E. C. Ellett reported the case of Mr. M. A., age 72. Four years ago he had an unsuccessful cataract extraction on his right eye by another physician, and the eye was subsequently enucleated. Left eye incipient cataract. Vision 20/100 with glasses. Preliminary iridectomy Jan. 18, 1922. Not very long after this he had prostatic inflammation and an operation on the prostate; so it was the last of March before he returned for the cataract operation. This was deferred on account of a slight ciliary injection and he was sent back home with atropin. May 13th, pupil widely dilated, eye very red, spots of exudate on the posterior surface of the cornea and tension increased (62 McLean). Some improvement with rest, atropin, dionin and subcutaneous injection of milk. June 3rd, paracentesis. Since that time the eye has improved very much. Tension still increased (60 McLean).

Sclerocorneal Trephining.

Dr. E. C. Ellett also reported the case of Dr. L. H., age 66. March 3, 1922. Failing vision for two years, central vision 20/29 each eye, fields as shown on the charts. Eyes not inflamed. Pupil 5 mm. and sluggish, marked cupping of both discs. Tension mercury tonometer 25 and 29, McLean 50, each eye. The tension varied as shown on the tonometer charts. June 5th corneoscleral trephine with peripheral iridectomy on R. June 9th corneoscleral trephine with complete iridectomy L., 2 mm. trephine.

Epithelioma of Inner Canthus.

Dr. R. Fagin presented Mrs. N. G., age 28, from Covington, Tenn. For the past five years has been working as a "spinner" in the Tipton Cotton Mills. She claims that the cotton lint gets in her eyes very badly and irritates them. For the past three months, a small warty growth has rather rapidly increased in size at the limbus, toward the inner canthus of left eye. This growth has the appearance of an epithelioma. The patient is now in the hospital preparatory to having the growth removed. The vision in this eye is still 20/20. The growth when removed will be sent to the laboratory for diagnosis.

S. S. Evans, Secretary.

WASHINGTON INTERNATIONAL CONGRESS.

Wednesday, April 26, 1922.

(*Continued from Page 761.*)

Vessels in Glaucomatous Patients.

Dr. Carlos Charlin, Santiago, Chile, had studied the cardiovascular conditions in 100 patients suffering from primary glaucoma; of whom 90 presented evidence of vascular disease. Of the 10 who were apparently healthy, 3 gave a positive Wassermann reaction,

Less than 30 years	1
31 to 40	2
41 to 50	26
51 to 60	30
61 to 70	31
71 to 80	9
Over 80 years	1

Of the 90 with manifest cardiovascu-

lar disease, 62 had arterial hypertension: 59 had aortic disease, of whom 21 showed lesion of the aortic valves; and 5 had myocarditis. The etiology of the vascular disease in 54 of these was attributable to syphilis; in 32 to arteriosclerosis, and in 4 to various or doubtful causes.

The study of the clinical material gathered by us teaches that the man suffering from glaucoma, in 90 per cent of the cases, is not alone suffering from his eyes, since he is also suffering from a general vascular affection. On the other hand, it is generally accepted to-day that in the glaucomatous process the fundamental anatomicopathologic lesion is the lesion of the ocular vessels. If both testings are compared, the general vascular lesion shown by the general clinical examination and the vascular lesion of the eye with hypertension, it is difficult not to accept a close relationship between the two processes.

At any rate, on account of the extreme frequency of a general affection with the glaucoma, we believe that these patients, after the ocular examination is made, should be submitted to minute clinical examination — inspection, auscultation, thoracic radioscopic examination, tests of arterial blood pressure, Wassermann reaction, and examination as to renal function. After the ocular and medical diagnoses are complete, there should be added to the ocular the general therapeutics of whatever condition the clinical examination may show.

Diagnosis of Glaucoma.

Dr. R. H. Elliot, London, England. Diagnosis helps us in two somewhat different directions. (1) To ascertain whether glaucoma is present or not; and (2) to enable us to decide whether to adopt therapeutic or operative measures in the treatment of individual cases.

There are few different problems confronting the ophthalmic surgeon which are more difficult than that of the diagnosis of a pathologic rise of tension in certain cases; yet a surgeon, who will take the trouble to avail himself to the full of the modern methods of diagnosis, need never be long in doubt as to the presence or absence of glaucoma. A correct diagnosis can sometimes be made only by waiting; but, if the surgeon is alive to the condition present, and loses no time in collecting the necessary data, it may be questioned whether the delay involved need ever lead to serious consequences. The same is true of the measures and observations necessary to enable us to come to a sure conclusion as to whether a glaucoma is progressive or stationary. Few systems are more evil than that of the collective consultation, in which a number of surgeons meet, conduct a superficial examination and assure the patient that he should or should not be operated upon. Such a method appeals powerfully to a patient and his friends. It is popular, dramatic and worthless. The diagnosis of a difficult case of glaucoma, whether the point at issue be the presence of increased tension or the question of the progress of the disease, can be established only by the work of an individual surgeon, who conducts a routine and careful examination to which he is willing to devote unlimited time. When all his data are available he may perhaps with profit lay them before one or more colleagues, and get the latter to check doubtful points which his work has revealed. This is not the method of the sensational novelist, the equally sensational newspaper paragraph writer, or, only too often the friends who prefer the consultation of a number of surgeons; but it is the one which best subserves the interests of the patient.

With this introduction we now take up a number of points in turn

THE CONJUNCTIVA AND SCLERA.

Circumcorneal congestion, which may be of a very pronounced type, is a constant accompaniment of acute and subacute glaucoma, whilst enlargement of the episcleral vessels, and especially of those which perforate the tunic of the eye, is the rule in chronic cases. These vessels are veins: (1) They have the appearance and color of veins; (2) when cut across in the course of an operation their bleeding is typically venous; (3) when the lumen of one of these vessels is closed at each of its ends as far apart as possible, it not only fills up from either end indifferently when the pressure is released, but it actually fills from lateral feeder vessels, even whilst the

two ends are still blocked; (4) under high magnification with a corneal microscope and Gullstrand slit lamp, no pulsation whatever can be observed in any of these trunks.

THE CORNEA.

The steaminess of this membrane in acute cases, and the secondary changes in late cases are too familiar to need more than a mention. There are, however, two symptoms due to the steaminess of the cornea which deserve notice, viz., mists and halos. The great importance of these lies, not merely in the fact that they attract the patient's attention very markedly; but still more in that they serve as a very delicate test of the recurrence and duration of exacerbations of the disease. Those who are suffering from simple glaucoma, even with mild congestive intervals, may never be conscious either of mists or halos; but the victims of acute and subacute attacks need never be in any doubt as to the recurrence of their trouble, once they have been trained to employ this test.

It is important to distinguish two quite different sets of conditions under which mists and halos are observed, viz., (1) in the early mornings, and (2) at those times of the day or night when fatigue is most pronounced. The early morning symptoms are due to the failure during the sleeping hours of the pump action, described by Professor Thomson, and exerted on Schlemm's canal thru the action of the ciliary and iris muscles. Those which come on late in the day, as the result of fatigue, are to be attributed to vascular congestion and are frequently relieved by food or rest. They, in fact, constitute the incursion into the case of the vascular factor as an outcome of disturbances of the vasomotor equilibrium.

Mists of Vision.—It is important to remember that these are due in part to edema of the corneal epithelium and of the superficial layers of the cornea, and possibly also of the endothelium lining Descemet's membrane; a similar condition of the retina almost certainly plays an important part in the production of the symptom. Such a condition is predisposed to by the cutting off in some measure of the arterial blood supply, and by the obstruction to venous return, both being factors which interfere with the due nutrition of the retina.

Halos.—These are best seen when looking at bright lights in the dark. When they are present, the ordinary patient can see them excellently around a match or candle flame held at arm's length. In the dark room the glow of a self lit ophthalmoscope bulb, especially when not too bright, gives very vivid halos. It is most important that our patients should understand what we mean by halos, since so many conditions may easily be confused with the true colored rings seen by the glaucomatous subject. For this purpose a glass plate dusted with lycopodium should be kept handy; once a patient has looked thru this he knows for all time exactly what we mean when we ask him whether he has seen colored rings.

The following conditions are mistaken for halos: (1) The golden haze made up from radiating luminous beams which a normal eye may see surrounding a light in the dark, and which is often dissipated by rubbing or drying the eye. (2) Imaginary halos seen by nervous people who have heard glaucoma discussed. (3) The scintillating scotoma of migrain. (4) The rapidly closing in rings of color seen by nervous or over tired people, when they shut their eyes in the dark. (5) The halos due to damage to the corneal epithelium produced by caustic or other medicinal applications. (6) The transient halos complained of by those who suffer from conjunctivitis. These are associated with mucous discharge, and they at once disappear on washing the eye; they are all probably due to the inclusion in the sticky mucus of masses of lymphocytes imprisoned in the conjunctival exudate. (7) The halos seen when looking at a bright light far back in a big room thru a steamy plate glass window from the dark outside; these are the same as those seen thru breathed on or steamy spectacle glasses.

(8) The halos seen by some patients in the early stages of cataract; these are said to disappear if looked at thru a pin point diaphragm. (9) The physiologic halos which any normal eye can see if carefully looked for. These are said to be brighter and more prominent in the old. (10) The physiologic halos seen by many normal eyes when the pupils are dilated.

The majority of these conditions can be easily differentiated from the glaucomatous halos by any surgeon who is acquainted with the fact that they may possibly be seen by non-glaucomatous people. A few inquiries will soon show their true nature. There are, however, some points which may here be emphasized. (1) The real glaucoma is much brighter than its imitators; the patient can very easily recognize at least three colors, a central blue, a middle yellow, and an outer orange red, or orange. In addition a band of green can often be detected between the blue and yellow. (2) The diameter of the glaucomatous halo varies considerably in different patients, and even in the same patient at different times. I have never found it less than 6.5 degrees, nor more than 11.54 degrees. The physiologic halos on the other hand, are stated by authorities to measure constantly about 7 degrees in diameter, and the colored rings are very feeble, requiring close attention for their recognition. (3) The fact that a patient sees a colored halo after the use of a mydriatic may easily lead to the suggestion that the surgeon has been guilty of negligence in the use of the drug. The danger is all the greater, since many members of the public are better informed on the subject of glaucoma halos than the majority of the medical profession. It is therefore essential, that in every such case we should take note of the diameter of the halos, of their brilliance, of the colors recognized, and of the tension of the eye at the time. By doing so we may save a colleague much underserved discredit.

So important did this subject appear to the writer, that he sought the assistance of Mr. H. H. Emsley, of the Northampton Polytechnique Institute, Clerkenwell. This gentlemen has most kindly spent a great deal of time and trouble over the matter. He points out that Druault's test, as suggested by Morax, is not quite accurate. If a true glaucoma halo, or any other halo due to interference with the corneal tissues, is observed and at the same time a straight edged screen (a stenopaic slit held vertically, does excellently) is moved across the area of vision close to the eye, the ring of the halo is obliterated just in proportion as the eye is covered by the slit. If, on the contrary, we observe a physiologic halo, and this is much easier with a dilated pupil, and move our straight edged screen across the area of the field of vision, an entirely different phenomenon is seen; due to the fact that the halo is here produced by the grid like crisscrossing of the lens fibers. As the screen comes across the eye, instead of seeing the complete halo, we now only see two rather narrow spectral bands, one at each end of a diameter of the halo. With the movement of the screen these swing around like the spokes of a cart wheel, traveling clock-wise or counter-clockwise alternately, according as the screen is moved in one or the other directions.

This beautiful little experiment of Mr. Emsley enables us to tell at once whether the halos—whether seen spontaneously by the old, or as the result of mydriasis in younger people—are produced by the lens fibers, or are truly corneal. In the former case they have no connection with the intraocular pressure; in the latter they may or may not have such a connection. A last word as to the measurements of halos: With the light ten feet from the observing eye, the diameters of the halos will be approximately as follows: For 4 degrees, 8.5 inches; for 5 degrees, 10.5 in.; for 6 degrees, 12.5 in.; for 7 degrees, 14.75 in.; for 8 degrees, 17 in.; for 9 degrees, 19 in.; for 10 degrees, 21 in.; for 11 degrees, 23.33 in.; for 12 degrees, 25.35 in.

THE ANTERIOR CHAMBER.

Shallowing of the anterior chamber may occur under two quite different conditions: (1) It may be the result

of an overdistension of the vitreous body, of congestion of the ciliary body, or both; or (2) it may result from the sealing down of the angle of the chamber, due to the adhesions of the iris base to the corneal periphery.

In either case, and especially in the latter, it may be important to be able to measure the depth of the anterior chamber. Much information may thus possibly be obtained as to the progress a case is making on the downward road, and as to the prospect of an operation proving a success. With regard to the latter point, the writer holds strongly that an iridectomy is useless once the angle is sealed down, unless it accidently gives rise to a filtering scar. If this be accepted, it is obvious that we should aim at performing a filtering operation to start with, and should not leave our main object to be the sport of chance. Again, if we desire to trephine, it is of importance to know beforehand how far forward the obliteration of the angle has progressed and, if we have reason to believe that it is a very far forwards, we should get all the corneal splitting we safely can.

Messrs. Zeiss have fitted to their corneal microscope a device known as the "Ulbrich drum." With the aid of this, and by a simple calculation, the depth of the anterior chamber can easily be measured. Even apart from any calculation, the relative depths of the same chamber can be estimated from time to time. This is probably the most important element in the case. These considerations have been put forward because it seems probable that important advances can be made if such lines of work are followed up; and America is far more likely to do the work than most parts of Europe, for the present at least.

Cloudiness of the anterior chamber, or deposits on the anterior surface of the iris, or posterior surface of the cornea, are signs of an iridocyclitis. Their observation is most important, as the diagnosis of the cause of the glaucoma, and the main indication for the exhibition of mydriatic drugs, hang on their recognition. This point was well brought out in the valuable discussion before the American Ophthalmological Society, at their 55th annual meeting, in 1919, in Atlantic City.

Koeppe has claimed that glaucoma can be recognized even in what he terms the "preglaucomatous stage," by the aid of the Gullstrand slit lamp, even months or a year before any other sign of the disease has appeared. He states, that as a result of the morbid changes, which are taking place, pigment granules are set free; and that these wander out in the form of a fine dust, and are to be seen on the surface of the iris stroma. The observation has been both supported and contradicted. The writer has certainly seen such granules in glaucoma cases. He has also seen unquestioned cases of established glaucoma, in which no trace of them can be detected. The matter is one of great interest. If we could, by any means, anticipate a certain diagnosis of progressive glaucoma, it would be of incalculable benefit to us, for we could then undertake a well planned operation at a date when everything is in favor of success, instead of being forced to resort to surgery at a dangerous time, as is now only too often the case.

THE CILIARY BODY.

The impairment of accommodation which accompanies glaucoma is too well known to require more than a passing mention. The appearance of a manifest hyperopia is less widely recognized as a sign of the disease, altho it is far from being uncommon. Its genesis is easily explained. The original condition in such cases was one of latent hyperopia; under the paralyzing influence of the increase of pressure, acting upon the third nerves and on their terminals in the ciliary muscles, the hyperopia has become manifest.

THE LENS.

Much has been written recently on the subject of cataract complicating glaucoma. It is necessary to distinguish sharply between 3 conditions which are often confused with each other:

(1) The form of cataract secondary to glaucoma is characterized by a want

of definition in its appearance. It looks like a smoky-greenish or bluish haze, and does not present the definite features with which we are all familiar in an ordinary primary cataract.

(2) Glaucoma secondary to cataract. The appearance of the lens in the majority of these cases is characteristic of the intumescent variety; the history is unmistakable, and the presence of a primary and hitherto uncomplicated cataract in the opposite eye clinches the diagnosis.

(3) Cataract, occurring as an accidental complication of glaucoma, is by no means uncommonly met with by any surgeon in large practice.

The socalled "green reflex" of glaucoma is not characteristic of the disease. Often it can be seen in old eyes; the conditions that favor its appearance are a dilatation of the pupil, combined with some want of perfect transparence of the aqueous humor, lens and cornea, or all three combined.

THE OPTIC DISC AND RETINA.

The typical *cupping of the optic disc*, on which so much reliance is placed, is a feature of established glaucoma, and is often absent in early cases. The sign may therefore fail us in the very class of cases in which the greatest difficulty in diagnosis occurs.

The method of formation of the cup in the great majority of cases is typical and unmistakable: (1) If a case is watched from the first, a slight and subtle change is observed at the very margin of the disc. Either around a large area, or thruout the whole circumference, it shows a slight depression, not sufficient to be estimated by the aid of the ophthalmoscope, but quite enough to be recognized by any trained observer. (2) At a slightly later stage a faint bend can be observed in the course of the vessels as they pass over this depressed margin. By this time the whole circumference of the disc tends to be involved. (3) As time goes on, the depression in the floor of the disc increases so it can be estimated ophthalmoscopically, and the kinking of the emerging vessels becomes increasingly accentuated.

The aberrent types of cupping are comparatively rarely met with. This is all the stronger reason for the surgeon to be on his guard and prepared to recognize them early. They are of two types: (1) The circular, central, physiologic cup, which gradually widens out toward the circumference on the papilla, and (2) the steadily enlarging physiologic cup. It is necessary to repeat that these are rare forms of cupping, and that the diagnosis of glaucoma in such cases must rest on a comprehensive survey of all the evidence that the case can afford. It is commonly believed that retinal *venous pulsation* is a sign of glaucoma. This view has recently been challenged, and the writer has therefore studied the subject very closely. There can be no question that venous pulsation, even strong venous pulsation, may be met with in eyes in which the tension is normal; and again that a complete absence of pulsation may be found in high tension eyes. There are, however, certain items of evidence which we must consider: (1) The exertion of a moderate amount of digital pressure on the globe will, in many cases, provoke a marked venous pulsation or exaggerate a pulsation already present. (2) The instillation of a mydriatic into the eye will, in a certain number of cases, have a precisely similar effect. (3) In a number of cases of glaucoma, a very marked venous pulsation will be found present, and in not a few of these this pulsation will disappear, or greatly lessen in character, after the performance of a successful decompression operation.

The writer's view is that when the other features of a case point toward glaucoma, the presence of a marked venous pulsation in the retina is a suggestive piece of contributory evidence. Further, the presence of such a marked venous pulsation, whenever it is detected, should raise in the observer's mind the possibility of a threatening of glaucoma. The circulation within the eye has a marvelous power of adapting itself to altered conditions, but in the transition stage from one condition to another the vascular system may give such evidence as we have been dis-

cussing, of the strain which is being put upon it.

Spontaneous pulsation of the *retinal arteries* is spoken in the textbooks as tho it were common, if not an invariable accompaniment of glaucoma; whereas the truth is that it is a sign which is very rarely seen indeed, and then only in the course of congestive attacks of the disease, passing away as soon as the exacerbation is got under control. The writer cannot recall a single instance in which he has detected it in an eye suffering from simple glaucoma, or in a congestive case in the interval between two attacks. In many of our cases of acute glaucoma, and by this we mean exacerbations of a glaucomatous condition, the media are too hazy to allow us to see pulsation of the retinal vessels. In others we can see the vessels and note the absence of pulsation, whilst in still others (and these are very few in number) a distinct and sometimes a very marked arterial pulsation may be clearly discerned.

We know that arterial pulsation means an intermittence of the even flow of blood thru the arteries, as a result of the intraocular pressure having risen to such a height that it is greater than the retinal arterial pressure, during the diastolic phase of the latter. In other words, it is clear evidence that the retinal circulation has become intermittent instead of continuous.

Very different grades of this condition can be recognized: (1) The arterial pulse is nothing more than a flicker, which affects the whole course of every branch of the retinal artery on the disc and even beyond it; it can be counted against, and confirmed by the radial pulse. Here we obviously have to do with the slightest possible interference with the retinal arterial circulation; it is only at the lowest phase of diastole that the even flow of the current is interrupted. (2) The arterial pulse becomes more and more marked; the phase of blanching of the artery may be so prolonged as to equal or exceed that of its greatest fulness with blood. Here the interruption of the retinal circulation is obviously becoming very serious. (3) In extreme cases the intraocular pressure has become so excessive that circulation can only be maintained at the height of systolic pressure; the phases of blanching of the vessels exceed those in which they are filled; giving almost the appearance of an aortic pulse, and justifying the similie used by a French writer; that the blood seems to spill in jets over the edge of the disc.

It will require but little consideration to show any thoughtful mind, that the watching of this phenomenon will provide valuable clinical data to observant ophthalmologists. So far we have been discussing the spontaneous arterial retinal pulse. We shall now turn to consider a phenomenon which can be observed not only in glaucomatous, but also in healthy eyes, and yet one which has a very definite clinical significance.

The induced *pulsation of the retinal arteries.* It is well known that by the exertion of digital pressure on the globe of the eye we can produce a pulse in the retinal arteries. This pulse follows closely the characters described in dealing with the spontaneous arterial pulse. With mild pressure the phase of interruption is extremely short. As the pressure is increased, it lengthens until it exceeds the period of onward flow. Finally if the pressure is made still greater, and it is questionable whether we have the right to employ such a means, the whole circulation thru the eye is stopped, and the current thru the retinal arteries definitely ceases.

The real value of these observations lies in the fact that, as the intraocular pressure rises, the amount of digital pressure necessary to produce a retinal arterial pulse tends to become less and less. Consequently, when we can evoke an arterial pulse by light pressure upon the eye, we are led to the conclusion, that the intraocular pressure has risen until it is nearly equal to the diastolic arterial pressure. The word "tends" has been advisedly and deliberately used, and for the following reason: There are cases of undoubted glaucoma in which quite considerable pressure is required before

the arterial pulse can be elicited; and there are cases in which no rise whatever of intraocular pressure has taken place, in which the diastolic pulse can be very easily produced by light pressure. This latter occurrence is most often met with in young persons. It is obvious that the former class of cases, the arterial pressure has risen *pari passu* with the rise in intraocular pressure—one more instance of the compensatory mechanism which is to be found in the eye, and of whose working we understand so little. In the latter class we appear to have to do with a condition in which the normal diastolic arterial pressure is unusually low.

Pallor of the Disc.—This pallor may be found under two quite different conditions: (1) It is seen in some cases of glaucoma at a very early stage, and is then presumably due to a constriction of the vascular supply as a result of the increased ocular pressure. That this should be so will surprise no one who is familiar with the very marked blanching of the disc, which is produced by digital pressure. It has been claimed that it may be a very early and very suggestive sign, in the absence of other evidence of an increase in intraocular pressure. This is certainly a point which should be carefully kept in mind, for in no disease is it truer that every shred of evidence helps. (2) It is met with as a marked, and often as an unmistakable, feature of established glaucoma. Its interest here lies not so much in establishing the diagnosis of the disease; which by this time has usually already been made without difficulty, but in furnishing a criterion as to the probable prognosis for vision, after a successful decompression operation has been performed. A similar relative pallor of the retina may sometimes be observed. This is, however, very difficult to appreciate, and a more significant sign is therefore to be found in a slight relative decrease of the diameters of the arteries as compared with those of the veins.

A dragging over of the retinal vessels in a bundle toward the nasal side of the fundus is a not uncommon phenomenon in late cases of glaucoma, and the appearance presented is very striking. Even when there are considerable opacities in the media of the eye, the bundle of red lines running inwards, and the contrasting dead whiteness of the disc in every other direction, furnish a picture which is unmistakable. This dragging over of the vessels is probably always associated with some measure of posterior staphyloma.

The Size of the Globe.—According to Priestley Smith, the average horizontal diameter of the cornea is 11.1 mm. in the glaucomatous as against 11.6 mm. in healthy eyes. The importance of this fact lies in the help it gives us when patients, with a glaucomatous family history, consult us as to the condition of their own eyes, being made nervous by the fear that they may have inherited the disease. Should we find that they have a low corneal diameter, we would be justified in recommending them to keep themselves under periodic observation, and to report the appearance of any suspicious symptoms of the disease. On the other hand, the observation of a large corneal diameter would be a distinct factor in enabling us to give a good prognosis.

The writer has been extremely dissatisfied with the devices employed for making these measurements; they seem to him far too rough and ready for their purpose. If it is imporaant to have the information, that information should be as exact as it is possible to make it. This is the principle on which all our examinations of the glaucoma patient should be conducted, if the opinions we give are to be really reliable. The requisites for a perfect instrument of the kind are: (1) A headrest must be provided so that the patient may be absolutely steady. (2) The instrument itself must be rigidly fixed on a firm stand. (3) The observed eye must have a definite point of fixation, so that it may not make the least move during the examination. (4) The scale and the eye must be sufficiently magnified to enable the observer to measure accurately in tenths, and preferably in twentieths of a milli-

meter. Messrs. Zeiss are constructing such an instrument especially for the writer, which will give a magnification of 8 diameters. This can be substituted for their corneal microscope on the standard adjustment stand of that instrument, and will be focused by a rack and pinion movement.

SUBJECTIVE PHENOMENA.

Pain.—Speaking broadly, pain is here as elsewhere, a measure of the congestion present. A simple glaucoma may run its whole course, without one moment of pain in the eye. Again, the early slight attacks of subacute glaucoma may be attended only by mild feelings of discomfort or of ocular pressure. On the other hand, the acute disease is marked by great suffering. Our principal interest in the subject lies in the fact that the trouble is not always referred to the eye. The patient, and even his medical advisor, may make the mistake of thinking that the cause of the trouble is in the teeth, the ears or nose; since the "neuralgia" complained of appears to start from one of those organs. Again as we well know, the headache, pyrexia and vomiting may lead to the erroneous and mischievous diagnosis of that refuge of incompetence, "the bilious headache." The taking of a meal or the obtaining of sleep may greatly alleviate the symptoms; such drugs as phenacetin and antipyrin are useless, while the bold instillation of miotics acts like a charm. All these are points that help the careful surgeon to a right appreciation of the cause of the patient's suffering.

Lacrimation.—According to Morax, various reflex troubles may suggest the commencement of glaucoma. The most suspicious of these is intermittent lacrimation, unconnected with wind or other provocative agency.

Nausea and Vomiting.—Morax states that, even if the glaucoma is untreated, the actual vomiting subsides within 24 hours, or at most 28 hours, while the sensation of nausea may persist for several weeks. He has met with patients suffering from subacute attacks, in whom the feeling of nausea was the only warning sign of a fresh rise in intraocular pressure.

Photopsiae are not unknown in the early stages of congestive glaucoma. They may occur as flashes of light, as the impression of a ball of fire which rolls across the field of vision, as sudden sharp, flash-like spots of light, or as a continuous luminous glow, lasting from seconds to minutes, or even longer. The patient is most apt to suffer from these photopsiæ when he is tired, and when he first gets into bed at night. It must be remembered that like symptoms may be observed under any conditions in which the retina is irritated, dragged upon, or otherwise interfered with. Nor must we forget that similar phenomena, but of central origin, are met with in neurasthenic patients suffering from errors of refraction, from migrain, and from other nervous troubles. Rest tends to relieve photopsiæ of retinal origin, whilst those due to cerebral troubles are often worst at night. Rainbows around lights have already been discussed.

Diminution of Visual Acuity is a frequent, if not a constant, sign of glaucoma. Its causes may be classified into medial and neuroretinal. The former includes interference with the refractile power of the cornea owing to overstretching of that membrane; corneal edema; deposits on the back of the cornea; degenerative and other permanent changes in the cornea; turbidity of the aqueous; opacities of the lens; deposits of various kinds on the surface of the lens capsule, and vitreous opacities.

Neuroretinal causes include pressure on and overstretching of the bundles of the optic nerve and of the layers of the retina, and starvation of the nerves and retina due to interference with the blood supply, as a result of intraocular pressure. The lesion may be manifested by a diminution of central vision or by an interference with the visual field. The former is practically always an evidence that a congestive element has entered into the case, otherwise good central vision is retained almost to the last. Defects in the field, on the other hand, are to be attributed to injury to the nerve fibers at the edge of the disc, reinforced by starvation of the retinal

blood supply. The distinction is obviously important.

The Visual Field.—The subject of the changes in the visual field in glaucoma is so vast, that it will only be possible to touch on a few of the main points of interest. The examination of a suspected glaucoma patient is very incomplete unless the fields have been carefully taken. Nor does one measurement suffice for each eye. The whole field should first be charted on a short radius (33 cm.) instrument, care being taken that the moving object is sufficiently small (not above 3 mm. in diameter for a daylight instrument). Next, the central portion of the field, lying within 26 degrees of the center, should be examined at a distance of 1 m. with a 1 mm. object. The results obtained by the two procedures are best kept on separate charts.

Perimetry of the Whole Field.—From this method we obtain very important indications: (1) There is a tendency for the nasal portion of the field to be affected before the temporal, and also for it to be more affected than the temporal, as the disease runs its course. Tho this is not an invariable rule, it is so frequent an occurrence that it deserves to be kept carefully in mind. (2) As the disease progresses, the whole field tends to shrink from the periphery towards the center. (3) The blind spot shows distinct signs of enlargement, even on examination by the small perimeter, if the fields are carefully taken from time to time as the disease progresses.

Roenne's step appears on the charts. This has been deliberately left until the last, not because it is the least important, but because the writer desires to draw special attention towards it. This sign is far too little known and appreciated. It is an evidence of the lesion of the optic nerve bundles at the edge of the disc, and it therefore clearly points to the essential pathologic process which is responsible for the harm done to the optic nerve as a result of increased pressure within the eye. This does not mean that it is necessarily pathognomonic of glaucoma, for we know hat other morbid conditions may damage the nerve fibers as the latter flow over the edge of the disc. Nor again, does it imply any doubt as to the influence of the vascular factor in the damage inflicted on the optic nerve and retina.

It is obvious that the nerve fibers and retinal elements which are starved of arterial blood and engorged with venous blood, as a result of increased pressure within the eye, must be thereby placed in a condition unfavorable to the resistance of trauma. In this we see the contributory element furnished by interference with the retinal and choroidal vascular blood supply; but it cannot be too strongly emphasized that for the essential lesions of glaucoma, and for the evidence whereby we diagnose them by means of perimetry, we must look to the edge of the disc and to the damage done to the nerve fibers at that area. This being so the importance of Roenne's sign stands out large against the background of other perimetric observations. Why has it been so little appreciated, and why is it so seldom observed.

The answer is: Because so much of the perimetric work in consulting rooms and other places is done against time, and sufficient leisure and trouble is not devoted to it. Moreover, as has been so often pointed out, this sign is best observed when the *circular* method of perimetry is adapted, for the simple reason that fibers whose damage we are studying run in arc like curves around the center of vision, and any lesions they sustain are most easily studied when the observed object travels along the length of the fibers instead of across them. To take 8 radial measurements of a field, and then to fill a chart by drawing lines between them is not perimetry; on the contrary it is bad work and is most unfair to the patient. It will not reveal the presence of a Roenne's step, nor will it give a true or even an approximately true idea of the state of visual field.

One point more deserves to be remembered: The glaucoma patient is sensitive to *changes in light*, and it is therefore important that periodical examinations of his field should be made as nearly as possibly under the same

conditions of illumination. It is difficult to obtain these by daylight in Northern latitudes, and for this reason self lit instruments, or those illuminated by artificial light are unquestionably preferable to daylight apparatus. At the same time it is very important to know the limitations of the instrument we use. These can only be learned by constant practice. Under no circumstances must either the fixation or the traveling object be too bright. If it is so the patient will soon become fatigued, whilst before this happens the limits of his field will be exaggerated.

Scotometry or Central Perimetry.— Bjerrum was the first to point out that in glaucoma we commonly meet with arc like scotomata which are connected with the blind spot, and which curve around the center of the field of vision to end on the horizontal raphé. Such scotomata may be met with above the horizontal raphé, or below it, or in both situations simultaneously. In the last cases we get ring scotomata. He maintained that these scotomata were the expression of lesions of nerve fiber bundles, at the edge of the disc. Roenne working on Bjerrum's hypothesis, looked for and found the sign, which is called by his name, and which we have already spoken of in connection with perimetry of the whole field of vision.

Seidel went a step farther and showed that very early in glaucoma, before any other sign of the disease could be certainly recognized, enlargement of the blind spot either upward, or downward or both, could be detected with certainty in a number of cases. These enlargements were always described as ending in single, pointed or rounded ends. From the first it appeared to the writer that this clinical feature was inconsistent with the accepted pathology of the condition, for, if it were a question of a lesion of a number of bundles of nerve fibers selected, as it were, out of the whole mass of the nerve, it would only be reasonable to expect that the lesions they would sustain would vary widely amongst themselves, and that therefore the scotoma produced would not end in a point but in a number of points. Experiments with Bjerrum's screen and with other apparatus of a similar nature failed to confirm this suggestion, until the writer devised the scotometer which bears his name. Then the scotoma with jagged points was at once found and has since proved to be so consistent a manifestation, as to make the appearance of this phenomenon of high diagnostic value.

Three principles are involved in the make up of this apparatus: (1) That of the circular, instead of the radial, method of examination of the field of vision, as advocated by Priestley Smith; (2) that of the magnification of the scale on which the phenomena are observed, so making the results easier to obtain and more striking to the examined eye, as advocated by Bjerrum; and (3) that of the examination of the field at intervals of 1 degree instead of those of 5 degrees or 10 degrees as is so often done. This last was a device which suggested itself to the writer's mind as likely to bring out the jagged nature of the scotoma, if this could by any means be accomplished.

It has been pointed out by some that the writer's sign is not obtained by other forms of scotometric apparatus, and it has consequently been suggested that it is an artefact. That this argument is not a very strong one is clear from the fact that the sign in question has been obtained in glaucoma cases by a number of reliable observers, who have abundantly confirmed the writer's findings with this instrument. A little consideration would show that it would be only natural to expect more accurate results from the Elliot instrument, when dealing with glaucoma cases, than from an ordinary scotometer; and this for the following reasons:

(1) As has already been shown the circular method has especial advantages in dealing with scotomata which are the result of lesions to nerve fibers at the edge of the optic disc, for these fibers sweep in curves around the central area of vision to reach the horizontal raphé; and it is always much easier, both for the surgeon and for the patient if, in taking a scotoma, we

pass thru its longest and not thru its shortest axis. Moreover, in the author's experience, a scotoma will always be carried further, and therefore shown at the greatest advantage, if we pass from the blind into the seeing area, instead of in the opposite direction.

(2) One can explore the whole field out to the 26 degree circle at 1 degree intervals by means of 26 circles easily, accurately and mechanically traced for us by a rotating disc; whereas to do this at the same intervals, working radially from the center, would demand 360 observations and would hopelessly tire our patients. Moreover the closely set radial lines for the first ten or fifteen degrees are practically impossible to dissociate from one another. (3) Whatever may be the verdict of other surgeons, nothing can shake the writer's conviction that the magnification of scotomata, whether these be physiologic or pathologic, makes the patient's task enormously easier, and the surgeon's results much more accurate.

The normal *blind spot* as mapped out by the new instrument does not differ materially from the records of other instruments employed for the same purpose. This is all the more important, since the field changes which it reveals in glaucoma are so very distinctive. We shall now consider these:

The jagged enlargement of the blind spot is so marked a feature in many cases, that it cannot easily be missed by any one who works with reasonable care. Even in quite early cases, the pointed enlargement of the normal physiologic scotoma may be highly suggestive of the presence of intraocular pressure. On the other hand, if under this test we find the blind spot of absolutely normal size in a suspected eye, we must regard this negative evidence as of great value in suggesting that there is no rise of intraocular pressure present, or at least that any such rise that may be, or may have been present, has probably up to date done no harm.

Detached Paracentral Scotomata.—A certain amount, tho not a great deal, has been written about scotomata in glaucomatous eyes, which are found at some little distance from the blind spot. Such defects are not infrequently met with when using the author's scotometer. If such a case is followed for some time, these defects can often be traced until they join up with the enlarged blind spot. They are obviously due to lesions of those nerve fibers, which are distributed to parts further away from the disc. Consider for a moment a bundle emerging from the optic nerve at the disc edge. It would naturally be expected that the fibers which would be earliest and most damaged would be those on the periphery of the nerve; such a lesion would be evidenced by an enlargement of the blind spot. If, however, those fibers which are distributed to the area of the retina, represented by that portion of the field close to the horizontal raphé, happen to be earliest damaged, we get one of these detached, paracentral scotomata close to the horizontal meridian. Again, if some of the intermediate fibers are damaged, we get a scotoma in corresponding position somewhere along the curved arc of the course of the bundle.

In explanation of these vagaries in the scotometric phenomena, the following considerations may be suggested: The bundles at the periphery of the nerve are most liable to be damaged by the sharp edge of the scleral ring over which they curve to reach the retinal surface. The central bundles, destined for the more peripheral parts, are more likely to be injured by the overstretching to which they are subjected when the nerve is pushed back under pressure. Variations in the anatomic arrangements of the nerve fiber bundles themselves may possibly explain some of the discrepancies in the phenomena observed. There are considerable anatomic variations in the supporting framework of the optic nerve head, and it is highly probable that consequently the nerve head yields differently in different eyes, and unevenly in the same eye. We are therefore justified in expecting that the injury inflicted will vary from case to

case, and will materially so influence the signs of disease presented by the perimetric picture.

(3) Invasions of the central area of the field. The surgeon who employs the writer's scotometer as a routine step in the examination of his glaucoma cases will be surprised to find how often the central area of the field is affected in eyes in which, under an ordinary superficial examination, he would not have suspected any such defect.

This is a matter of great interest and importance. The writer has seen patients whose medical men believe that they are holding their own, and whose fields, taken on an ordinary small radius perimeter, supported such a view, and yet they themselves were firmly convinced that they were losing ground, as indeed they were; careful scotometry at once showed that they had good reason for their complaints. The value of the writer's instrument in explaining such cases, in following doubtful eyes before coming to a decision as to operation, and in gauging the effect of operative or other treatment must be experienced to be appreciated.

The invasions of this area of the field tend to move steadily onward toward the obliteration of the upper, or of the lower central field, or of both. Two clinical types are thus evolved: (1) When the scotoma is confined to either the upper or the lower field, the condition may amount to a nearly complete central hemianopia before the patient is aware of the serious defect in his vision. This can only be the case when the opposite eye is comparatively normal. For obvious reasons the hemianopia is always superior or inferior, and never lateral. (2) When the invasion of the central field takes place simultaneously above and below the horizontal meridian, the patient is more likely to detect it at an early date. The progress of the formation of a ring scotoma can be watched in such cases thruout its stages.

The diversity met with in different glaucoma fields has already been commented on, and some indications of its various causes have been furnished. We must now shortly discuss the influence of the incursion of the vascular factor on the broad features of these fields. As has already been pointed out, the field changes which are due to the mechanical effects of intraocular pressure owe their variations to anatomic differences in the supporting framework of the nerve head, and in the arrangements of the fibers of the nerve. If the congestive element could be excluded entirely from a case, we should get very different, but always clear cut, perimetric pictures, and from these we would be able to speak with very little hesitation as to the nature and extent of the damage which has been inflicted on the optic nerve.

This, however, is far from being the case. The element of congestion has to be reckoned with in most instances. (1) In some it dominates the whole picture, blurring all details like a fog lying across a landscape. (2) In others it modifies our findings to a considerable extent, and yet we may be quite unable to apportion the just amount of blame to the two great factors, the mechanical, modified by anatomic circumstances, and the congestive. In yet others, the vascular factor is so weak that it is with the utmost difficulty we can trace its influence. This, however, we may say truly, that while simple glaucoma tends to produce definite and uneven curtailments of the field, the entry of the vascular factor blots out, or tends to blot out, the sensitiveness of the whole retinal area.

TONOMETRY.

There are comparatively few ophthalmic surgeons, and probably none in America, who do not make abundant use of one or another form of tonometer. Even the student of to-day is trained to employ this instrument just as naturally as he does the thermometer or the binaural stethoscope. The ophthalmologist who does not do so, fails in his duty to his patients and is an anachronism. Some use the Schiötz, some the Gradle and some the McLean. It matters comparatively little which model we adopt, so long as we keep to one and learn to understand

its indications. Nor is it a matter of any great importance from the clinical point of view, that the translated reading in mm. Hg. may not accurately represent the intraocular pressure in the eyes measured. We cannot fix for any tonometer a point below which the recorded pressure is certainly normal, or a corresponding point above which it is supernormal. For we know that the pressure may vary considerably in different normal eyes; what may be low for one may be normal for another, and what may be normal for a third may be high for a fourth. It is to take an altogether perverted view of the use of a tonometer to regard its readings as if they were of the nature of a scientific laboratory experiment. They are nothing of the sort, and it may be a long time before they ever become as accurate as this.

On the other hand, the indications they do give us are of the greatest possible value: (1) In a very large number of cases they tell us most definitely whether the intraocular pressure is distinctly high or normal. (2) When the pressure is different in the two eyes and especially if there are other indications of glaucoma in the higher tension eye, we are confronted with a very strong suggestion that a pathologic rise in pressure is present. (3) Variations in the pressure of an individual eye occurring from time to time, afford us a most valuable criterion of the progress, favorable or otherwise, that the case is making, and of the value of the medical, operative, or other means that we are employing in the treatment of the case. In this connection Butler's tonometer charts deserve a mention, as they enable the surgeon to follow up his cases at a glance.

It must be quite clear that nothing which has been written above is meant as a criticism of the efforts which have been made to standardize the Schiötz tonometer. Such an aim is altogether desirable, and I would like to pay here a tribute of admiration to the splendid work done in this field by American surgeons and especially by McLean.

THE LIGHT SENSE.

There can be no question that the light sense is profoundly affected in glaucoma. We know this well from the bitter complaints of our patients. They frequently tell us of their difficulties when they pass from light into darkness, or vice versa. Moreover, bright days dazzle them, whilst in dull cloudy weather they have difficulty in finding their way about. An examination of the light sense ought therefore to be productive of valuable data.

It has been claimed by reliable British writers that in the earlier stages of glaucoma there is a rapid reduction in light minimum sense, but only a very slight reduction in the light difference sense, whilst in incipient atrophy the reverse is the case. On the other hand, French writers have obtained diametrically opposite results, finding the light difference sense the first to be attacked, and the light minimum sense to be only diminished in the presence of optic atrophy. The writer has been much troubled over this question. He has met with well established cases of glaucoma in which the light sense, tested by various instruments, does not appear to be inferior to the normal, either in minimum or in difference, and yet the patients undoubtedly suffer when the light is reduced. He suggests as a possible explanation that the central light sense, like the central visual acuity may long remain practically normal, whilst the peripheral light sense may share the deterioration with which we are so familiar at the boundaries of the visual field. The writer would emphasize that he in no way wishes to set up his own opinions on the subject against those whose findings differ from his, and that the remarks he has now made on the subject are merely a call to other workers to persist in unraveling a tangled skein. Nor is the interest of the subject purely academic; on the contrary, the most valuable results from the point of view of the early diagnosis of the disease may spring from such work. It would be of interest if members of the Congress would give their views on the best pattern of photometer for use in the examination of glaucoma patients, and if they would at the same time, indicate the means they employ for differ-

entiating central and peripheral acuity of vision for light.

CONCLUSIONS.

This paper has endeavored to take up and deal with a few of the less well understood aspects of the diagnosis of glaucoma. The subject is far too vast to be treated at length, and the writer is deeply conscious of the many deficiencies of his contribution. There are certain points that he would like to insist upon with the utmost emphasis:

1. In order to decide whether glaucoma is present or not, the patient should be exhaustively examined. This is a long, painstaking, fatiguing business, and cannot be accomplished at one sitting, or the subject will be over tired, and the data collected will be untrustworthy. Given time, patience, and suitable equipment, any surgeon should be able to make up his mind definitely either (1) that a patient has glaucoma and requires treatment or, (2) that he has not got glaucoma; or (3) that, in the absence of definite and distinct signs of the disease, the case should be followed and watched until an unhesitating opinion is arrived at.

No means should be neglected to make the diagnosis as precise as possible; the history should be taken; a routine inspection of the eye should be made in a good light without any form of apparatus, and later an examination by oblique illumination with the aid of a corneal loupe, the refraction should be carefully estimated; the normal diameter and the depth of the chamber should be measured; further details should be sought for with the corneal microscope, the fields being illuminated by a Gullstrand lamp; the possibilities of ophthalmoscopy, perimetry, scotometry, tonometry and photometry should be exploited to the full; halos, if present, should be measured. Then if the surgeon, having thus made the most of the means at his disposal, is still in doubt, he has little, if anything to lose by watchful waiting.

2. The second point is the complement of the first: A diagnosis of glaucoma should never be made on any one sign or symptom, no matter how suggestive it may be. Such a course can never be necessary and is not justifiable.

3. Once glaucoma has been definitely diagnosed, the patient should be very carefully watched, and if he is going down hill in spite of general and therapeutic treatment, an early operation should be undertaken to reduce the intraocular pressure. The recurrence of congestive attacks is a strong indication for a decompression operation. One of the most delicate tests of such recurrences is the observation by the patient of halos around lights. If the congestive attacks are well marked, the diagnosis is obvious. It is only in the very mild subacute exacerbations of glaucoma that we need to rely on such a test.

In these cases where all evidence of congestion is absent, we must look for our indications to scotometry, tonometry, ophthalmoscopy, the testing of central visual acuity, etc. The order is deliberate, and indicates the writer's views as to the relative importance of the methods.

Much has been said and written about an exaggerated tendency to resort to operation for glaucoma. What has impressed the author more than anything else in connection with this disease, during the eight years that he has practiced in Europe, has been the inclination, even of very able surgeons, to postpone a glaucoma operation if it is possible to do so. He believes that where one operation is undertaken too early very many are put off until far too late. From the days of von Graefe and de Wecker onward, it has been a guiding surgical principle that the earlier an operation is undertaken for the relief of glaucoma, the better is the prospect of success. It is the operations performed at a late stage which give us the worst results, and the later the stage the worse the prognosis.

Blood Pressure in the Vessels of the Eye.

Dr. A. Magitot and Dr. Bailliart, Paris. It has long been known that a slight compression of the eyeball causes arterial pulsation in the retina. Physiology enables us easily to understand that this arterial pulsation ap-

pears when the tension of the ocular media reaches the diastolic pressure of the central artery of the retina. Similarly, we know, that the pulsation will cease when the pressure exercised thru the ocular media is greater than the systolic pressure of the central artery. It was soon discovered that, in the cases of patients suffering from arterial hypertension, it was necessary to exercise on the eyeball a strong pressure to bring about the disappearance of the retinal pulsation; Bailliart (1909), then Melville Black (1911), and Deyl (1912) had drawn attention to this method of recognizing the existence of arterial hypertension.

In order to measure the arterial pressure in the central artery of the retina, it remained therefore only necessary to know the amount of force it was necessary to apply to the eyeball to bring about the appearance and disappearance of the pulsation. Th. Henderson had, for this purpose, constructed as early as 1914, an apparatus which calculated in millimeters of mercury the pressure which, exerted on the exterior surface of the eyeball, was sufficient to bring about the appearance of the diastolic pulsation. Henderson thought, which is not altogether incorrect, that by adding the ocular tension to the figure given by his apparatus, he would get the diastolic pressure of the central artery.

Bailliart in 1917 suggested a method for determining the figures of the diastolic and systolic pressures of the central artery. By means of a special dynamometer, graduated in grams of water, so that it might be easily verified on any scales, a pressure is exerted on the eye in the region of the insertion of the rectus externus until the operator notes the appearance and then the disappearance of the retinal pulsation. Two successive readings will thus give the amount of force which it is necessary to exert to balance the diastolic and then the systolic pressure of the central artery. But the thing that it is then important to know is, how the primitive ocular tension has been modified by these dynamometric pressures; for, finally, it is by its intermediary that we act on the vessels of the eye.

Thomson Henderson has had the idea of measuring in millimeters Hg. the pressure exerted by him on the eyeball and of adding to it the ocular tension determined by means of Schiötz's tonometer. But in this method there is a double cause of error; first, from a physical point of view, two successive pressures do not add up together; and on the other hand, the pressure transmitted by a liquid is proportional to the surface compressed. Here is, however, another method:

In a dark room, the patient being placed in a recumbent position, the operator causes the appearance and disappearance of the pulsation and notes the weight in grams necessary to obtain these two results. Then Schiötz's tonometer is applied to the eye, while at the same time by means of the dynamometer is exerted a pressure equal to that which was found necessary a few moments before to produce the appearance and disappearance of the pulsation. The tonometer weighted with its heaviest weight will indicate approximately in millimeters Hg. the pressure exerted on the vessels of the retina. It is evident that the greater the pressure exerted on the eyeball the greater will be the ocular tension.

But this method complicates the operation, and is only possible with exceptionally docile subjects. It is for this reason that we undertook to study experimentally, on an animal, the modifications of the intraocular tension under different pressures, and to draw up a chart. But to be of use clinically, the knowledge of these modifications of the "ophthalmotonus" caused by pressure exerted on a healthy or diseased eye, must apply not only to a particular case but to a whole series of figures of initial tensions. The method would indeed be singularly restricted, if we only knew the tensions produced by a pressure of 10, 20, 40 or 80 grams on an eyeball, the initial ophthalmotonus of which would be uniformly 20 mm. Hg. It is indispensable to acquire a knowledge of the effect produced on different initial ophthalmotonus, for we must evidently suppose that the same pressure of 20

grams will produce a different tension in an eye of which the primitive ophthalmotonus was 15 mm. Hg., and in another of which the ophthalmotonus would be 30 mm. Hg.

The drawing up of such a chart was possible only by experiment. We carried our researches on cats anesthetized with chloralose, this product being easier to manipulate than curare, and causing only a slight modification in the general blood pressure, on condition that the animal is not allowed to get cold. We have also made use of a mercury manometer invented by one of us, the manipulation of which appears to us to be easier than that of other instruments.

The ocular tension of the cat oscillates between 15 and 25 mm. Hg. according to conditions. It was therefore relatively easy to establish the figures of ophthalmotonus starting from these initial tensions. But it was necessary to obtain greater tensions and others still weaker. We were able to produce higher starting figures by practicing subconjunctival injections of NaCl. We were thus able to obtain quite easily tensions of 40 or 45 mm. Hg., rarely more.

In order to operate on lower ocular tensions than 15 mm. Hg., we had recourse to a deeper narcosis in order to act upon the general blood pressure. But we were unable to obtain less than 10 mm. Hg., which in the cat as in man is the average postmortem tension.

(1) We chose the cat in preference to the rabbit, which is, however, an easier animal to handle, on account of its ocular nervous system which is very similar to that of man. Yet both of them possess a much larger anterior chamber, and we do not know whether the general elasticity and resistance are identical with those of the human eye.

We have avoided producing modifications of the tonus by injection or aspiration of the intraocular liquid, as these means give erroneous figures for the two following reasons:

1. On account of the resorption.

2. On account of the intraocular vasodilatation, which very probably takes place after a few seconds. As to the pressures, they are made by means of Bailliart's dynamometer, which is either held in the hand or immovably fixed in a ratchet support.

The accompanying chart will avoid any useless descriptions. It gives us the figures for pressures applied horizontally (as on a patient sitting or reclining) on eyeballs, of which the initial tensions vary from 10 mm. to 50 mm. Hg. It will be noted that the different lines starting from different initial tensions, are remarkable for their parallelism and also for being nearly straight. It results from this, that this chart can be completed for all the initial pressures and for all pressures applied.

It will be seen that with this chart the determination of diastolic or systolic arterial pressures in the branches of the central artery becomes easy.

We first measure with Schiötz's tonometer the initial ocular tension, then we seek what dynanometric pressure will bring about the appearance and later the disappearance of the arterial pulse. We then refer to the chart and find in millimeters Hg. the required figures. In an eye of normal tension, in a subject whose arterial pressure is normal, the arterial retinal pressure is about 35 mm. for the diastolic and 70 mm. for the systolic.

If the retinal circulation has a primordial importance since it insures the visual function, the choroidal circulation also plays a considerable part; the part it takes in the modifications of the ophthalmotonus is well known. It is, moreover, possible by studying the effects produced by compression of the eye, to obtain notes on the uveal circulation similar to those obtained on the retinal circulation.

Sometimes, particularly in extreme myopia, it is possible to perceive thru the retina the choroidal vessels; but we can but ill distinguish the arteries from the veins, and on the other hand these vessels never show unless in certain exceptional cases, either spontaneous or forced pulsations. When considerable pressure is applied, it is even difficult to tell at what precise moment they are emptied, and even if we did know it, this would have little value since we cannot distinguish the small arteries from the small veins. Conse-

quently the direct examination and measuring of the arterial pressure in the choroidal vessels is not yet possible.

In a recent work, G. Leplat has shown that it was possible, under certain favorable conditions, to study by vision the blood pressure in the arteries of the dog's iris, by making use of the process we have described. The importance of this fact is truly considerable; this process enables us to acquire for the first time some notions on the circulation of the uvea, of which the iris is the sole portion which is clearly visible.

In man, unfortunately, the iris circulation, like the choroidal circulation, does not lend itself to these investigations, and however great was our desire, we were unable (even with the magnification of Czapski's glass) to observe any iris pulsation. It may be that we should see in this fact a confirmation of Henderson's opinion, that the arterial circle of the iris in man is in reality a venous circle.

The dog, which Leplat used for his researches, possesses in the periphery of the iris, particularly on the side toward the nose, veritable arterial trunks of which the beatings can be seen with a magnifying glass of low power or even, under good conditions of lighting, with the naked eye. The observation of the pulsatile arterial reactions is thus very easy and enables us to study, as our Belgian colleague has done so well, the pressure in the vessels of the iris. On our side, we have undertaken a series of researches for the purpose of studying comparatively the iris circulation and the retinal circulation; and we have made use of the cat. The dog which is a good subject for the vessels of the iris, appeared to us to be of no service for the study of the vessels of the retina; for its central vessels when they reach the disc are already divided into fine branches surrounded by neuroglic tissue. This disposition does not allow the beating to attain the amplitude desirable.

The retinal vessels of the cat, apart from their being disposed on the periphery and not in the center of the disc, and their ciliary origin, resemble on the contrary fairly exactly the vessels of the human retina. At the limit of the dark grey disc we see three or four arteries, each with a vein running by its side. The artificial beats which we provoke must always be sought for in the immediate circumference of the disc. They are, moreover, very easy to observe; when the appropriate pressure is applied to the eyeball, three or four small arteries can be seen beating simultaneously.

The vessels of the iris are per contra rather less easy to observe than those of the dog. In order to see them well, it is necessary to make use of Czapski's microscope, and to examine the nasal extremity of the horizontal meridian. A voluminous vein (particularly if one looks very closely at the root of the iris, before its bifurcation) will be seen lifting up the trabecular tissue; at this spot we recognize the existence of spontaneous arterial movements which pressure on the eyeball exaggerates and transforms into veritable pulsations and finally suppresses completely. If the retinal pulsations of the cat are always easy to see, it must be added that the pulsations of the vessels of the iris are sometimes less so.

The comparative study of these two pulsatile phenomena has enabled us to remark that in the eye of the cat the pressure in the arteries of the iris and of the retina is practically the same; if in the average case it has been necessary to apply some stronger pressures to study the pulsation in the iris than in the retina, this is due, no doubt, on the one hand to the greater difficulty of observation in the iris. We can give as an average in the cat for the arteries of the iris and the retina, 45—100 mm. Hg., which figures are slightly higher than those in man.

These experiments on animals have led us to recognize that the systems of blood vessels of the retina and the uvea, so similar to each other in many ways, have in their normal state an identical working pressure.

We have since had fresh confirmation of this in a work of Vossius. This author had occasion to examine with the corneal microscope a filament of an iris

in a persistent pupillary membrane. On applying dynamometric pressure to the eyeball he noted that circulation was arrested when the ocular tension reached 70 mm. Hg. We know that this figure (70 mm. Hg.) is also that which we found for the normal systolic pressure.

The study of the effects of graduated and known pressures on the eyeball has also led us to other results. We have been able to observe a constant phenomenon which can be formulated as follows:

1. From an initial tension of 15 mm., there exists always a lowering of the ocular tension after each application of the tonometer, however correctly the application be made. Example, take an eyeball of which the tension is 20 mm. Hg.; submit it for a duration of three seconds to a pressure of 30 grams. We shall find immediately after that the ophthalmotonus is no longer 20 mm. Hg., but only 15 mm.

2. This phenomenon no longer exists when the same pressures are applied to the eyeballs, possessing only a tonus of 10 to 12 mm. Hg.

3. This phenomenon is exaggerated when the pressure is applied to eyeballs in which the tension has been raised artificially in our experiments by means of subconjunctival injections of hypertonic serum.

These modifications of the ocular tonus under the influence of slight pressures applied to the eyeball had already been noted in tonometric experimentation. The remark had already been made clinically in 1911 by Polak Van Gelder. Using Schiötz's tonometer he noted that in normal individuals the repeated application of this instrument, at intervals of 3 or 5 seconds, always furnished figures inferior to the first ones. If we translate into grams the pressure exerted on the eyeball, by the tonometer loaded with these weights of 5 or 7 grams, we see that it varies from 21 to 25 grams. In Polak Van Gelder's tables, we note that the difference between the ocular tensions before and after this tonometric pressure is about 10 mm. Hg.

This fact is also quite clear when dynamometric pressures are applied to the eyeball in order to measure the arterial retinal pressure. If, when by means of a given pressure we have managed to efface the last arterial pulsation, this pressure is maintained for a few seconds, it will be seen that the arterial pulsation reappears very rapidly; to suppress it, greater pressure must be applied; if this pressure is maintained the pulsations reappear. Thus the ocular tension diminishes immediately and constantly under the influence of dynamometric pressure. This fact must be noted as it explains why beginners, who proceed by feeling their way, always find very high figures in their attempts to determine the arterial retinal pressure.

This lowering of tension under the influence of pressure is moreover very transitory; to the depression there succeeds even a slight ulterior elevation which lasts a very short time.

How can we explain this diminution of the ocular tension under the influence of ocular pressure? Evidently by the issuing of a part of its liquid contents. The supporters of the continuous stream of the aqueous humor explain it by a more active filtration of this liquid, which is driven out of the eyeball by the mechanical effect of the compression. For our part we believe that the question is not so simple. Remembering the modifications of the ocular tonus under all the influences which can act upon the circulatory system of the choroid, the fall of the ophthalmotonus after ligature of the ciliary arteries or of the carotid, after stimulation of the "sympathetic," its rise which follows inhalation of amyl nitrit and after division of the sympathetic, we remain convinced that the compression of the eyeball acts by emptying the choroidal system, and that this mechanical expansion of the external coat of the eye brings about the fall of the ocular tonus, which rises again when little by little the blood fills once more the exceedingly rich vascular system of the uvea. (See p. 777.)

Plastic Operations About the Eye.

Dr. John M. Wheeler, New York. Surgery of the eyelids, eyebrows and orbital region should be performed by

ophthalmologists, and not by those who have no special knowledge of surgery of the eye region. General surgeons are uninformed on the peculiar features and requirements here, and they are not trained in the refinements essential to success in plastic eye surgery.

Plastic eye work enriches the field of ophthalmic surgery and broadens the scope of the ophthalmologist without interfering with the special skill which he must develop in order to perform successfully the important operations on the eyeball proper. And certainly nothing should be allowed to detract from the high importance of the skill and refinement and judgment called for in handling such conditions as cataract and glaucoma.

In studying and applying methods for handling cases of deformity about the eyes, I have always had in mind these two things: First, to avoid adding new deformities thru my surgery. Second, to develop procedures which are as simple as possible, and which are appropriate for general adoption by trained eye surgeons.

In order to make satisfactory comparisons of the relative merits of different sorts of grafts in corrective surface work of the eyelids and thereabouts, I have used different types of grafts and different methods on the same patient. One patient who needed more than one correction received a true skin flap from the inner aspect of the arm, a free graft of true skin from one temple, and a pedunculated flap from the other temple. Another received epidermic grafts from the thigh, and true skin from an upper lid. Another, a pedunculated flap from the temple, a free graft from the arm and a free graft from the upper eyelid, and so on. Thus, by making different sorts of combinations, it was possible to study results in an unprejudiced and convincing way.

CICATRICIAL ECTROPION.

In most cases of traumatism resulting in ectropion, only a single eyelid is involved, and the lower lid suffers more frequently than the upper. The most satisfactory correction can be obtained by means of an inlay of true skin from one of the upper lids. It is surprising how seldom one or the other upper lid will fail to provide ample skin for grafting. A match in appearance is assured without the creation of an additional deformity. There need be no fear for the upper lid on account of removal of the skin. A fusiform flap of true skin 50 mm. long and 25 mm. wide can be taken safely from most any normal upper eyelid, and some could furnish much greater width. In one young adult I have taken, at intervals of a few months, three separate grafts from the left upper eyelid without lagophthalmos or appreciable deformity. The stretching of this skin tissue and readjustment to the normal appearance are remarkable.

A description of this operation was published in the Journal of the American Medical Association, Nov. 19, 1921.

Occasionally we have to deal with extreme ectropion of all the lids associated with facial burns, and large loss of the cilia and brows. Usually the outer canthus is pulled well down out of position and there may be epicanthal folds. In such cases it may not be feasible to implant true skin grafts, and it is convenient to resort to epidermis. Fortunately, in these bad burn cases epidermis matches the scarred tissue of the face about as well as true skin from a distant part, and it is possible to cover as large areas as necessary.

A figure shows at the lid margins the little areas denuded of epithelium in preparation for the adhesions to hold the lid margins together. These adhesions are important in the correction of all ectropion cases, but especially so in the severe cases, where large denuded areas have to be covered. After passing the sutures to secure apposition of the raw areas of the margins, a single large piece of epidermis from the outer aspect of the thigh is placed over the lids, overlapping the margins of the denuded areas all around. For this purpose a graft with an area of 9 to 12 square inches may be needed. No sutures are used for it, but the pressure of a secure dressing and bandage are relied on to hold the graft firmly in place. After placing the skin in

position, a slit should be made in it just in front of the palpebral fissure to provide for drainage of conjunctival secretion. It is well to make a slit also in the rubber tissue which is placed over the graft. Dressing and after care are the same as described for the dermic graft. In cases with bad facial scars, especially if there is a tendency to keloid formation, it may be wise to leave the interpalpebral adhesions for as long as a year, and it may be necessary to graft a second time if late contraction of facial scar tissue pulls the palpebral fissure out of place. When the work is completed, the external canthus should be on a level with the internal. In making the preparatory dissection, the tissues should not be handled roughly. Artery clamps should not be used unnecessarily and no ligatures should be used on bleeding vessels.

Removal of the true skin graft from the upper lid is very simple as compared with the dissection of a dermic flap from the arm, thigh or elsewhere. Almost no allowance need be made for contraction. In removing the graft, I do not use a grasping forceps of any kind for fear of bruising the tissue cells.

The graft should be covered with rubber tissue, having the slightest smear of sterile petrolatum. I prefer to put the tissue on in two layers with the grains running at right angles, to guard against the possibility of perforations thru separation of the tissue fibers. The rubber tissue will prevent the skin graft from getting dry. If a covering other than rubber tissue is chosen, it should be of smooth surface, pliable and without perforations. Over the tissue, gauze fluff is packed and secured firmly by adhesive plaster, and then by pressure bandage, which in turn should be secured by adhesive plaster. It is well to put a separate dressing over the other eye, to be left for two or three days, and then to be cut down without disturbing the main dressing and bandage. This should be left for six days, at the end of which time it is removed with the utmost care, and the graft painstakingly cleansed with damp (not wet) boric acid sponges, and all sutures taken out. At the first dressing the grafted skin will appear pink, not anemic like a graft from the arm. The outlines of the beautiful inlay are hardly seen even at the first dressing. Rubber tissue, gauze dressing and bandage, changed every two days, are continued for another week; then dressing is no longer necessary, and the graft is kept smeared with a little sterile petrolatum.

About three weeks after operation, it is well to start massage with petrolatum. This is kept up daily for several weeks. The adhesions between the lids should remain for at least three months. They should be left until all tendency to malposition of the lid has passed. They are then cut with the scissors and no deformity results from them.

In ectropion, I now find use for pedunculated flaps only in those cases where there has been loss of bony tissue and a consequent depression to be filled in. Here thickness is called for. A flap can be turned down from the temple or forehead by the well known methods of procedure, and the thickness can be gauged to suit the needs of the case. That is, where the depression is greatest the flap can be made thickest.

RESTORATION OF BROW.

Dislike for making new deformities and desire for simplicity have kept me from turning pedicled flaps from the hairy scalp or elsewhere in attempts to bring about the formation of new brows. I have used only free grafts. Loss of the brow is usually not complete, and rather satisfactory patch work can be done in some cases by taking from one part of the brow to fill out another, or by taking from one brow to help out its fellow.

Possibly the most satisfactory way of grafting for an entire brow or a large part of one is to remove a flap of scalp from the occipital region of the desired size and shape and place it in position. The hair follicles are usually closely placed in the middle of the occipital region, and they are well slanted. Moreover, no visible scar re-

sults. One objection to the scalp graft is that the color of the hair may not accurately match the color of the fellow brow. Another objection is that a part of the graft may be lost. The reason for this is that the scalp tissue is thick, and the graft cannot be made thin without injuring the hair follicles, which are long enough to go entirely thru the scalp skin. One cannot transplant thick detached grafts with confidence, as is possible with thin skin grafts.

In preparation for removal of the graft, the scalp area should be shaved, cleansed with alcohol and ether, and painted with iodin. The graft needed is usually rather long and pointed. The curved incisions for its removal should slant toward each other, so that a cross section of the graft is like a truncated wedge with base at the surface. This will fit deeply into the depressed exposed area in the brow region, as the sides of this depression will be "banked." In taking a scalp flap there is inevitable destruction of some of the hair follicles, but with a complete take or nearly that, a good mat of hair should result. The graft should be sutured in place and firm pressure applied. The resistance offered by the skull is a valuable help to the pressure dressing in getting firm contact between raw surfaces.

RESTORATION OF CILIA.

There are several types of cases calling for restoration of the eyelash line. I should like to give four suggestive ideas.

Occasionally in extreme ectropion the upper lid margin is found in the brow, and it is possible to make the releasing incision in the lower part of the brow instead of below it, and so carry down a hair line at the time of the dissection made in preparation for the epidermic graft. This idea is decidedly worth bearing in mind.

Where the lid margin is not actually in the brow and epidermic grafts have covered both upper and lower lids, and the lids are held together by adhesions in front of the eyeball. Hairs should be taken as largely as possible from the nasal end of the inferior border of the brow, as here they are more numerous than at the temporal end and stand out in better direction. The idea in turning the graft upside down is to bring the hair line as near the lid border as possible. A few weeks after the interpalpebral adhesions have been cut the lid margin should be trimmed off evenly close to the new cilia line.

3. In another type the eye may have been lost, and a part of the lid margin with the cilia may have been destroyed. In such a case a curved incision may be made near the injured margin, and the skin below it dissected up. Then this skin is rolled back and tied down to the fundus of the socket with silk sutures. Then a graft from the nasal end of the lower margin of the brow is placed so that the hairs will line up with the remaining cilia as accurately as possible. The hairs of the graft really overlie the unrolled skin and so fall in line with the cilia. A little trimming of the margin of the lid may have to be done later.

4. Another possibility should be borne in mind. When skin of the upper eyelid is used for ectropion of a fellow upper lid or a lower lid, it is feasible to carry the upper graft incision into the lower part of the brow and so carry with the graft a line of hairs to be placed for cilia. The graft below the cilia line may be made as large as desired. If this idea is used, in order to bring the hair line to the lid margin, the graft is carried directly to the denuded area, without turning, for the lower lid; but for ectropion of the upper lid the detached graft has to be turned upside down.

It would be absurd for one to expect a perfect line of eyelashes to result from any attempt at substitution, but patients are delighted with the imperfect results which can be obtained by the schemes suggested.

NOTCH AT LID MARGIN.

In the Archives of Ophthalmology in January, 1920, I referred to a method of handling this condition and called

the little procedure the "Halving Operation."

The little mass of scar formation around the laceration of the tarsus is excised, and the tarsal flaps are cut clear across to give accurate apposition. Assuming that the deformity is in the upper eyelid, care should be taken to excise fully as much tarsus at the upper margin as at the lower in each flap of the tarsus. This is important, and even a slight overcorrection of the notch can be obtained, at the surgeon's discretion, by diverging the tarsal incisions from the lid margin, so as to make the tarsal flaps slightly shorter above than below. The skin and orbicularis are cut so as to make a flap on one side, and a rectangular area of tarsus is exposed on the other. If necessary, to prevent tension on the wound, especially if the eyeball has not been removed, a canthotomy should be performed, and the breach of the external canthal ligament should be severed to release the tarsus. The little tongue of skin is trimmed enough for adjustment, and a small triangular piece of skin may be removed above to avoid puckering. The conjunctiva and tarsal flaps are first sutured. A mattress suture is carried thru the flaps, and tied after passing thru a small rubber plate cut from sterile tubing. Sutures are introduced to give good apposition of the skin flaps. The mattress suture should be removed in two or three days, and the others about five days after operation.

An important point is that tarsal wound and skin wounds should never be in the same position, but should be placed in such a way that there is overlapping. Thus, what is known in carpentry as halving is accomplished, and union is assured, even if there is a little sloughing of the skin. Furthermore, recurrence of the notch formation is prevented. After healing there is no break in the continuity of the lid margin or in the row of eyelashes. In handling notch cases, different short-cut procedures have been tried, but the "halving" method has been the only satisfactory one in my hands.

TRAUMATIC COLOBOMA OF LOWER LID NEAR INNER CANTHUS.

A rather common injury is that of laceration of the lower eyelid thru the canaliculus, extending downward and outward more or less accurately along the lower orbital margin. Improper primary healing of such a wound results in a coloboma near the inner canthus and ectropion of the lid near the coloboma. Complete correction of this deformity can be obtained by a simple maneuver. Scar tissue at and near the coloboma is dissected away. An incision is carried from the coloboma downward and outward. The attachment of the lower lid to the external canthal ligament is severed, and if necessary, another incision is carried outward and slightly upward from the outer canthus. The flap is undermined as much as necessary, so that its apex can easily be carried to the inner canthus. The amount of dissection necessary will depend upon the amount of tissue loss at the coloboma. Sutures are placed diagonally along the incisions in such a way as to advance the whole flap and have as little pull as possible for the sutures at the apex of the flap during the healing process. Of greatest importance is the adjustment of the tissues at the apex of the flap. The small amount of skin just external to the inner canthus is carefully and completely undermined. The skin and orbicularis are stripped from the anterior surface of the tarsus so as to expose 4 or 5 mm. of the tarsus. A suture is carried thru the exposed tarsus, and then it is carried well into the internal lateral ligament or into the deep fascial tissue behind it, so as to get a firm hold. A mattress suture mounted with two needles is carried thru the exposed tarsus, then thru the flap of the skin which has been dissected up near the inner canthus. When the sutures are snugly tied the apposition will be secure, and the lid will lie well back against the globe and well up to the proper level, or even high enough to be in a position of overcorrection. Without this careful adjustment and definite overlapping of

raw surfaces one cannot be sure of complete obliteration of the deformity.

RESTORATION OF OBLITERATED SOCKET.

Many suggestions have been made for making new sockets after obliteration, and many disappointments have resulted from various sorts of procedures. The method which I have adopted I can recommend with confidence. Epidermis has been chosen as the most satisfactory tissue for lining the cavity, as it will give a thin, pliable lining, free from hairs and an excess of oily secretion. The lateral aspect of the thigh is usually the most convenient place from which to take it. No elaborate preparation is necessary. The part from which the epidermis is taken is shaved and cleansed with alcohol and ether. Then with a long bladed knife or razor with a keen edge, a large piece of epidermis is taken. For taking the graft I am now using the Stille (Norwegian) graft knife, and an interested barber gives it an exquisitely sharp edge, without which it is impossible to get a large graft free from perforations and free from true skin.

If the lid margins are adherent, they are separated by an incision. The dissection is then carried out in such a way as to separate the lids from the orbital contents. The following points should be borne in mind:

1. The dissection must be kept superficial, so that in front of the dissecting knife or scissors there is only lid tissue, i. e., only skin, orbicularis, the thin fascia of the lid, and the tarsus. It is not necessary to save the tarso-orbital fascia with the lid. Carrying the dissection back into the orbital tissue is probably one of the most common causes of failure.

2. Not only the superficial plane of the dissection, but the extent and limitation for the dissection are of importance. Temporally and below, the dissection should be carried well to the orbital margin or even 1 mm. or 2 mm. beyond it, as the graft must adhere to the periosteum of the anterior aspect of the orbital margin. On the nasal side, the dissection should be extended to the anterior crest of the lacrimal groove and to the orbital margin above it. In dissecting at the inner canthus the caruncle should be saved if it has not been destroyed. The graft will adhere to the posterior surface of the caruncle and give it a permanent lining. In the division of the tissues above, the dissection should be carried behind the orbital rim but not necessarily to the roof of the orbit. In some cases the levator can be saved.

3. In preparing the bed for the graft all cicatricial and granulation tissue should be removed. Excision of granulation tissue is especially important as the contraction of such tissue may result in contraction of the socket. Reduction in size of the newly made socket is due to contraction of the underlying tissue rather than to contraction of the skin itself.

4. A common fault which manifests itself after restoration of the socket is that of too great thickness of the lid margin. This deformity can be obviated by cutting away the tarsus. If the skin graft must extend completely to the margin of the eyelid, the tarsus may be split and thinned. If the graft is to extend nearly to the margin, sufficient tarsal plate may be cut away so that the graft will set in as an inlay. In any case, enough tarsus should be left to support the cilia, but not necessarily any more. A form should then be moulded to fit the cavity. Dental impression compound is ideal for this purpose. Ordinarily for full restoration of the socket, the dimensions are approximately as follows: Length 40 mm. to 45 mm., width 30 mm., thickness 5 mm.

The ideal graft for socket restoration is one without perforations which is made up of epidermis only, free from layers of true skin, and large enough to be wrapped around the form of impression compound with generous overlapping. This means a graft 3 1/2 to 4 inches long and about 3 inches wide.

The graft of epidermis is immediately wrapped about the form of impression compound, raw surface outward. and overlapping on the surface which is to be anterior. The form, completely

covered with epidermis, is forced into the socket cavity. It is not necessary to remove small blood clots before placing it as they will not prevent a take. The overlapping portion of the graft is placed forward so that if the edges are disturbed by manipulation they can be carefully replaced thru the palpebral fissure so that every part of the form will be covered.

No sutures are used. A pressure bandage is applied, and over this adhesive strips. Very firm pressure is of importance to secure accurate contact at all points and to keep the cavity absolutely obliterated. This first dressing is left in place for a week. The form is left in place and is not touched for about three weeks. It is then removed and left out permanently. The artificial eye may be introduced at any time.

If the surgeon has been successful in carrying out the technic, the result will be a permanent socket, extending well beyond the canthi and of sufficient dimensions all around. The lids will be normally thin and pliable, and the thin walled socket will not prohibit motility of the stump and artificial eye, altho the movements of the eye will be somewhat less than those following ordinary enucleation.

An interesting development is that usually lacrimal secretion will find its way into the new socket and maintain a comfortable moisture. As far as I know, trouble never results from activity of the lacrimal gland.

Blepharoplasty for Bilateral Lagophthalmos.

Dr. J. N. Roy, Montreal, Canada, reported the case of a nun, who came for double lagophthalmos existing for a quarter of a century. At the age of twelve years, while working in a mechanical laundry, her hair caught in a belt; her head was drawn against a joist and she was instantly scalped. Her eyebrows were torn away and lower lids were drawn up covering the palpebral opening. When temporofrontal growth of epidermis occurred, the external canthi were raised even with the upper lids, and after a year the patient could no longer close her eyes. A double lagophthalmic keratitis appeared, and the skull cicatrized very slowly.

Roy made, under local anesthesia, an incision of about 5 cm. in the region of the canthus and external quarter of the displaced eyebrow. After dissection and drawing down of that part, he took from the cheek an appropriate flap to fill up the space so produced. This flap was kept in place by a silk suture, and after detachment of the skin adjacent to the incision in the neck, the lips of the wound were well drawn together and sutured.

This blepharoplasty, practiced on both sides, gave a perfect result as to opening and closing the eyes, even as to the symmetry and horizontal position of the palpebral openings. Photographs illustrated the condition.

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CAUSES OF OCULAR PALSIES.

The paralysis of one or more ocular muscles, producing dizziness, nausea, double vision and manifest inability to turn the eyes in certain directions, should at once raise the question of causation. Clear understanding of the pathologic condition present, light upon its exact location, prognosis as to its probable course and outcome, and especially the early treatment of the condition, rest upon what is known of the cause.

Trauma may be thought of first, and should be carefully inquired for. The motor nerves that supply the extraocular muscles run a course that exposes them to injury from falls or blows striking on the head, and the later consequences of such trauma. Lacerations of the nerve tissue or sheaths, pressure on the nerve fibers by resulting exudate or hemorrhage, are likely to occur. It is possible that violent shaking may lead to functional impairment, or subsequent degeneration in the neurons of the nuclei of the nerves.

The double vision and other symptoms may not appear immediately after the injury, so that their dependence on it may not be thought of. Inflammatory exudate and hemorrhage may produce their effects slowly, and failure of nerve function may be gradually progressive after pressure has arisen. The diplopia may not be fully established for many days; and earlier symptoms ascribed to the general effects of the shaking up, rather than to the embarrassment of ocular movement. Closure of one eye, or swelling of the lids, or confinement to bed for other effects of the accident, may delay the discovery of the diplopia. Injury to other parts of the nervous system, concussion and mental hebetude, even when not very manifest, may prevent the patient from recognizing the character of his disturbance of vision.

Next to trauma may be mentioned nontraumatic lesions of various sorts situated mostly in the orbit. These are unusual, but on that account more obscure and liable to be overlooked. They include inflammations involving the muscles, their tendons and sheaths, or the motor nerves supplying them; or

of the periosteum and other connective tissue structures of the orbit. Such inflammations arise in connection with general disease, or by extension from the bony walls of the orbit or the neighboring sinuses. Malignant disease invading the orbit, especially by metastasis, may cause paralytic disturbance of the ocular movements, the origin of which is likely to be very obscure. Otitis media causing abducens paralysis might be mentioned with such local lesions. From these local causes the paralysis may arise by nerve block thru pressure, or by inhibition to avoid disturbance of inflamed tissue by movement.

The share of lues in causing ocular palsies has probably been more justly estimated in the past, 20 to 50 per cent, than the proportion of luetic inflammations of uveal tract. Yet new statistics, based on the application of new methods of diagnosis, and more rigid logic in dealing with the grouping of such cases, are needed. These questions all arise: Is lues present? If present, does it cause the paralysis? It is erroneous to assume because the patient has lues, it is certainly the cause of his ocular palsy. Thirdly: What is the relation of parasyphilitic disease to syphilis? Then syphilis causes so many different kinds of lesions. Is the paralysis due to a gumma, a vascular lesion, or a toxic degeneration of nerve cells? Prognosis and treatment will depend on the answering of such questions by complete diagnosis.

The relation of focal infections to ocular palsies has not been studied much beyond the observation of suggestive coincidences. Focal infections fall heir to the cases formerly classed as rheumatic, with all the indefiniteness and uncertainty that pertained to the real nature of such cases in the past. Weakness of accommodation associated with focal infections has been more frequently reported. As to the manner in which focal infections cause paralysis of the eye muscles, the old explanation of neuritis seems to hold good and receives support from the experimental studies of the tendency of certain strains of streptococci to produce neuritis.

Of acute infectious diseases that cause ocular palsies, diphtheria leads, with influenza and epidemic encephalitis closely following. In the latter disease, double vision is often a first symptom, and may be transient or intermittent. With diphtheria, influenza and most other acute infections, the paralysis of the ocular muscles is a sequel. With diphtheria it may be first noticed several weeks after convalescence from the general symptoms and local lesions in the throat; and is usually a much later effect of the diphtheria toxin than paralysis of accommodation.

The share of such chronic diseases as tuberculosis, diabetes, gout, etc., in causing paralysis of ocular muscles is probably due to their tendency to cause local lesions in various structures, or to lower the plane of vital processes in a way that might be compared with the tendency of old age. Such lessening of resistance must be taken into account in connection with all influences that tend to cause ocular palsies, and should not be accepted to the neglect of careful search for more active causes. Among active causes, poisons must not be forgotten. Lead, carbon monoxid, botulism, alcoholism, and ptomain poisoning are the more important poisons which damage the nuclei of the ocular motor nerves. Abducens paralysis may attend spinal anesthesia by cocain, or procain.

Recurring oculomotor paralysis is a rare but very interesting condition. It begins with intense headache, commonly unilateral, and often there is nausea, vomiting, fever and general weakness. The paralysis due to the first attack commonly recovers completely. But recurrences leave progressively greater paresis, until paralysis may be permanent and complete. Whether it is caused by some toxin or by repeated infective or anaphylactic conditions is still unknown.

E. J.

TAKING THE NEAR POINT.

The power and range of accommodation of an eye are known by measuring the refraction and taking the near point. The refraction is measured, as a matter of routine, in a large proportion of cases; but the taking of the near point of distinct vision is often neglected. Yet asthenopia arising from eyestrain usually depends on strain of accommodation. It is generally assumed that if hyperopia and astigmia are present, the accommodation will be strained by much near work, and the assumption is mostly correct. Correction of the error of refraction may give relief without any study of the power of accommodation in the particular case. But one cannot know how much the accommodation is strained, without knowing how much of it there is to do the required work.

The best advice is based on complete knowledge of the case. It is a neglect of professional duty to prescribe for strain of accommodation on an assumption based on age and general symptoms; when we can know so easily just what the accommodation is and how much can be properly expected of it. The data regarding it are usually all at hand, except the position of the near point, and this can be so quickly taken by simple methods, that the neglect of it is inexcusable.

It is not only in presbyopes that the near point should be taken to determine the convex lenses to be given for near work. Weakness of accommodation sometimes exists and causes annoying and persistent asthenopia long before the "presbyopic age." Diminished but still active accommodation may continue to cause eyestrain, much later than the common assumption would have it eliminated. Squint in children and heterophoria in older patents, may be closely dependent on defective accommodation. The state of the accommodation can supply an excellent indication of the strength and endurance of the general neuromuscular system. Knowledge of the accommodation supplements what we learn by taking the visual acuity and state of refraction, giving certainty and definiteness to certain indications they furnish. The taking of the near point should be as much a part of the routine examination as use of the distance test letters and trial lenses.

The test cards commonly used for determining the near point have been better for roughly testing the near vision of presbyopes, when the near point has moved off until distinct vision at the working distance is not possible without the help of convex lenses. The finest type in the Jaeger series is clearly visible at one half meter to eyes with standard vision; and is therefore quite unsuited to determining the near point at shorter distances. To attempt to determine the near point at one-fourth meter, where it commonly is when presbyopia begins, with Jaeger No. 1, is about like trying to measure the visual acuity at twenty feet by use of forty feet test letters. Type of ordinary type metal cannot be cast fine enough for taking the near point of young patients. The molten metal is not sufficiently fluid to run into such fine lines, and leave such small spaces between them. Test cards for taking the near point must be obtained by photography, reducing the printed matter produced from larger clear type to the size required for this purpose.

Various optical houses have put out near vision test type produced in this way, the best having a type just legible for standard vision at one-fourth of a meter, ten inches. But even such type does not afford a strictly accurate test for the near point of distinct vision in young persons, who have a near point of one-tenth meter or less. Reproductions of printed pages are sometimes available, that furnish letters only recognizable at the near point of children, but generally the original type has not been perfect, the reproduction defective and the size of the letters reproduced not planned for this particular purpose. Duane has rendered a real service in devising a more delicate test; altho it is not capable of the

pseudoobjective character, given to such tests, by requiring the patient to read the letters that he claims he can see clearly.

But the fact that the tests at our disposal are far from ideal, is no excuse for not applying more generally the tests that are readily available; or that can be improvised anywhere that the fine print used in the advertising pages of most magazines can be found. In early life the position of the near point gives a quick, simple indication that the eye tested is hyperopic or myopic. This is true even of eyes with lowered acuteness of vision; if the size of type made out at the near point is compared with its distance from the eye and the visual acuity, as tested on the large test type at five or six meters. In early adult life the position of the near point still indicates the probable kind and amount of ametropia, or is evidence of paresis of the accommodation or early presbyopia. For the period of presbyopia, it is the key to any satisfactory choice of lenses. At all ages it should be considered in relation to convergence and esophoria and exophoria.

The actual taking of the near point is an extremely simple matter and consumes very little time. Hold the test type used in front of the eyes far enough away to be easily read. Then slowly bring it closer to the eyes until the reading ceases in spite of the patient being urged to make the greatest effort to keep the print clear. A graduated rule or scale held in the other hand gives the distance of the card from the eye; or, as Duane prefers, from the anterior focus of the eye, 14 mm. from the cornea, where the spectacle glass would usually be placed. Holding the card in this position, alternately cover one eye and then the other and let the patient state whether it is equally clear to both. If not, the near point should be taken for each eye separately. All this can be done in a minute or two, and no other part of the routine examination will yield more for the time occupied by it. E. J.

BOOK NOTICES.

Diseases of the Eye. M. Stephen Mayou, Surgeon to the Central London Ophthalmic Hospital. Third edition, 12 mo., 334 pages, 145 illustrations, 4 color plates. London and New York, Oxford University Press.

This book is written for students who are beginning their study of the subject, with an appreciation of the fact that the medical curriculum for the medical student is already overcrowded; and for the practitioner, who wants to find quickly something about conditions that he does not keep constantly in mind, so that he turns naturally to the one book about such diseases with which he has become familiar.

It admirably fulfills its purpose, presenting the most important facts, stated briefly and clearly. The reduction of an account of ophthalmology to meet the needs of the student is not merely a shortening of each chapter, a percentage allotment of space devoted to each branch of the subject as compared with that given to it in a complete textbook; certain things have to be omitted entirely, while others need to be treated rather fully. This requirement has been met by Mayou with wise discrimination.

There is a chapter on methods of examination, 23 pages, which the student should master thoroly if what he learns in other parts of the book is to become available for the service of patients. In this chapter, one may be surprised to find five pages devoted to examination of the field of vision with illustrations of Mayou's and Elliot's scotometers, and McHardy's perimeter. But a little reflection shows that the field of vision has a diagnostic importance in general medicine and surgery, that has not been appreciated; and we must expect that the interest in it on the part of general practitioners will be greater than has been manifested in the past.

The second chapter, on elementary optics and refraction, 31 pages with 15 illustrations and diagrams of meri-

dians of astigmatism and cylinder axes, gives sound practical instruction, carried as far as is possible in such limited space. It is calculated to enlist the interest of the student, and make him believe, if circumstances place him in a community where better service in dealing with errors of refraction is not available, that he can correct ametropia as well as he can treat disease, when he leaves the medical school to begin his real life training in his chosen vocation.

Diseases of the conjunctiva we would expect to have extended consideration in a book intended for the education of general practitioners. It has a chapter of 48 pages, containing 22 illustrations, 13 of which deal with the pathologic histology and bacteriology of the conjunctiva. Cornea and sclera have a chapter of 23 pages, diseases of the uveal tract have 28 pages, the lens 11 pages. The retina, vitreous and optic nerve are considered in a single chapter of 40 pages. Glaucoma has 11 pages, the extraocular muscles and movements of the eye 14 pages, diseases of the lids and lacrimal apparatus 18 pages, and the orbit 7 pages. There is a separate chapter on operations, containing 44 illustrations, among which occur these errors; Figures 117 and 118 are transposed, and in Figure 139 the positions of the two parts A and B are reversed.

The appendix contains a series of 26 prescription formulas, of most general usefulness, and a statement of vision required in the dozen different branches of public service. There is a good index, 10 pages. The color plates represent 2 normal and 6 pathologic conditions of the ocular fundus. The volume is excellently printed and very convenient in form. We predict that as it comes to be better known in America, it will be rather widely used among medical students.

E. J.

Myopia and Its Treatment by Tuberculin. George Hirsch, Halberstadt, Germany. 49 pages.

This is a paper covered brochure of 49 pp., devoted to the contention that myopia is a condition of the eye caused by weakening of its coats, due to changes in their nutrition caused by tubercular toxins; and to the treatment of the condition by the injection of doses of tuberculin, and also to the prevention of myopia by prophylactic dosing with this remedy. A revised English edition is in preparation—subscription at the author's address—the latter we hope in a little better English than the advertisement.

The contentions of the author are based upon the relative frequency of myopia and tubercular conditions, presumably in his own country; as well as upon the researches of other authors which show some relation between tuberculosis, the disordered general and local nutrition, and shortsightedness.

All children are hyperopic when born. Progressive myopia begins from the 5th to the 7th year, when the eyes are not used so much for close work as later on. He also shows that most well read people are not myopic, and that most of the myopes go to the optician and not to the eye doctor. He quotes Koch, Saemisch, Bertrams and many other authors in regard to the formation of antitoxins in the blood. These substances fight off most of the diseases of men. Tubercle bacilli are found in the cornea, conjunctiva, etc., and some diseases of the eye are accepted as being of tubercular nature.

He shows that myopia is due to the formation of posterior staphyloma, and is produced by changes in the nutrition of the posterior portion of the eye, which is supplied by the short ciliary arteries, which supply the choroid. Many authors are quoted showing the relation between myopia and civilization, and as to myopia, syphilis and tuberculosis. Statistics are given regarding the relation of these diseases, the average being 10 to 30 per cent of myopes. According to the author the tubercular toxin has a special action upon the posterior portion of the eye. Cases are quoted. The tubercular toxin also produces an effect upon the anterior ciliary arteries and in the production of squint.

Tubercular diseases of the eye and of the ear are sometimes combined. Cases are quoted of myopia and tubercular diseases of childhood. A number of pages are given with case histories of myopia in the family. He thinks that the tubercular toxin often selects the one eye without affecting its fellow. Cases are treated by him with doses of antitoxin seemingly causing betterment, and he apparently believes that protection is afforded the child by prophylactic treatment by tuberculin.

H. V. W.

Essentials of Laboratory Diagnosis. Designed for Students and Practitioners. **Francis Ashley Faught,** M. D., Philadelphia. Seventh edition. 78 illustrations, 11 plates. Philadelphia. F. A. Davis Co.

This is a very readable book, being written in a manner that the general practitioner, specialist, and the student may make a complete review of the progress of laboratory diagnosis to date. Even tho he sends all his specimens and laboratory cases to the laboratory worker for such examination, if he would read this book and then keep it for reference in special cases, he would himself, as well as his patients, gain by its possession. It does not take the place of exhaustive text books, but supplements them by descriptions of simple and reliable methods of obtaining the results of laboratory examinations. The newer methods are well described, the chemicals discussed, the microscope and its appurtenances, clinical hematology, the spectroscope, newer methods of blood examination, sphygmomanometry, animal parasites, feces, urine, blood, fundus, milk, etc., and a full appendix, giving laboratory test stains, standard solutions, etc., with a full glossary.

The reviewer found of special interest the discussion of blood pressure and the use of the sphygmomanometer to determine it, the description of sero diagnosis as to syphilis, typhoid and other diseases. The book is well printed and sufficiently illustrated.

H. V. W.

CORRESPONDENCE.

Asteroid Hyalitis.

To the Editor: The paper of Bachstez, "Acid fat lime as basis of a species of scintillatio corporis vitrei," abstracted in the JOURNAL (Vol. 5, page 414), demands some comment which will clarify facts and thus prevent confusion later on. The description given by Bachstez of the condition, is so characteristic as to be identified readily with that of asteroid hyalitis by anyone familiar with this clinical entity created by Benson in 1894. (Trans. Ophth. Soc. U. K., v. XIV, p. 101.) Bachstez himself seems to have felt that his cases belonged in another group than scintillatio and to have intended to express this by the words ". . . a species of. . . ."

In spite of the many cases recorded in the American literature (Holloway, Stark) and the comparative frequency of the symptom complex—I have notes of about eight cases of this kind and none of *true* scintillatio—this confusion can be explained by the fact that Benson's description has found notice in the textbooks only very lately, that of Weeks in 1910 being to my knowledge the first to mention it; even the latest German edition of Fuchs' book by Salzmann does not separate asteroid hyalitis from scintillatio corporis vitrei.

Whether asteroid "hyalitis" is the proper name for the condition is still a question, but until a better one is found, Bachstez' cases ought to be recorded where they properly belong, under asteroid hyalitis. This is of especial importance since they help establish the fundamental fact concerning the chemical composition of the opacities in asteroid hyalitis, announced a few months before by Verhoeff (A. J. O., vol. 4, page 155).

M. FEINGOLD.

New Orleans, La.

Radioactive Photometers.

To the Editor: In January, 1919, the AMERICAN JOURNAL OF OPHTHALMOLOGY published an article of mine, "The Determination of the Minimum Light Sense and Retinal Dark Adaptation

with the Presentation of a New Type of Photometer."

A radioactive substance "Marvelite" was used as the source of light in the photometer described, and observations made with this instrument, tho elementary in character, certainly confirmed several physiologic principles in the dark adaptation of the retina.

At the time my experimental instrument was constructed, the manufacturers of "Marvelite" were of the opinion that after a certain initial period of decrease in intensity, the luminosity of the substance would maintain a constant value for an indefinite period, and therefore, it seemed to offer an ideal test object for photometric examination, if its intensity could be standardized, and this seemed possible.

Circumstances compelled me to postpone any further investigations with the instrument for a year or more; and when I resumed work with it, I was surprised to find that the luminous discs had decreased markedly in intensity, altho they had not been mounted in the instrument until they had been aged over a period which was supposed to give them a constant light value.

I wrote to the Bureau of Standards at Washington for information concerning these luminous radium compounds, and the following letter explains why it is impossible to construct a satisfactory photometer of the type with which my experiments were conducted.

DEPARTMENT OF COMMERCE.
Bureau of Standards.
Washington, D. C., June 24, 1922.

Dr. Jesse W. Downey, Jr.,
529 N. Charles St.,
Baltimore, Md.

Subject: Use of Radium Compounds with Photometer.

Dear Sir:

1. Referring to your letter of June 21 regarding the permanency of self luminous radium compounds, and their possible use as a standard source of light in a photometer, we regret to say that none of these products are sufficiently permanent for the purpose.

2. Because of the pressure of other work, our investigations on self luminous materials have been carried on only in a very fragmentary way, and we have not recently issued any publications on the subject. However, we can say with considerable certainty that none of these materials can be expected to maintain their luminosity for a very long time. In the case of materials used for the illumination of clock faces, instrument dials, and similar purposes, the useful life is ordinarily two to five years, even if the materials are made up of genuine radium. The reason for this relatively rapid decrease seems to be that the material which is made to glow by impact with radium particles becomes exhausted.

3. If you are interested in the details of investigations on the performance of these compounds, we can probably refer you to some publications covering researches made elsewhere.

Respectfully,
F. C. BROWN,
For the Director.

As my paper was abstracted and favorably commented on in several journals and at least one text book, namely, The Year Book of Ophthalmology, The British Journal of Ophthalmology, and Elliot's, A Treatise On Glaucoma (Second Edition), I feel that this explanation of my failure to produce a practical photometer warrants publication.

JESSE W. DOWNEY, JR.
Baltimore, Md.

Molluscum Contagiosum, Errata.

To the Editor: My father, some time ago, asked me to call your attention to some errors in the abstract on Molluscum Contagiosum, which appeared in the digest of literature, O. L., for March, 1922, page 145. He thought it might be possible to make a correction in some future issue, of the whole last sentence of the abstract, which should have read "they conclude:—that molluscum contagiosum may exist on the skin of the lids is well known; that it may cause conjunctivitis is not well known to ophthalmologists; that a single molluscum nodule on or near the

lid margin, even without the distinctive umbilication" and so on as it is printed.

The errors, while only involving about three words, have entirely changed the sense of the conclusions, and he would appreciate it if they were corrected. I also wish to correct a report from one of our local society meetings, appearing in the AMERICAN JOURNAL OF OPHTHALMOLOGY, 1922, No. 7, page 567. In speaking of the use of the thermophore, the abstract states, "Dr. Patton reported, that he used 150° centigrade" which should, of course, be Fahrenheit.

Sincerely yours,
S. R. GIFFORD.

Stops Unauthorized Statement.

To the Editor: I am enclosing a letter I have just written to the Umbsen Manufacturing Corporation, which will speak for itself, as I feel sure there are a number of men who would wish to take the same action I have done, but may now find it unnecessary. I am sending you the letter, which I wish you would publish in the AMERICAN JOURNAL OF OPHTHALMOLOGY.

July 28, 1922.
Umbsen Manufacturing Corporation,
Rochester, N. Y.
Gentlemen:

A publication issued by the Umbsen Manufacturing Corporation entitled "The Verdict of the Ophthalmological and Medical Professions on the Hydro Eye Spray," Bulletin No. 2, has just come to my attention. The following quotation appears therein:

"Dr. J. W. Burke, Washington. Approves of spray and says it will have hygienic value. Cannot see where it will be of great use in professional treatments. Says—'Take this to the people and they will approve. The profession cannot dispute its claims to merit.'"

I have never made any such statement to any member of your company, nor have I authorized any such statement to be made, or my name used for advertising purposes.

I must therefore insist that you *immediately* discontinue the circulation of this or any other bulletin containing the statement above quoted. I must have a reply to this letter within a week assuring me of the discontinuance of this bulletin, otherwise I shall have to bring it to the attention of the United States postal authorities and place the matter in the hands of my attorneys to take such action as they may advise.

Very truly yours,
JNO. W. BURKE.
Washington, D. C.

BIOGRAPHIC NOTICES.

PIETRO BAIARDI was born in 1862. He finished his medical course at Turin, and took up the study of Ophthalmology in Reymond's clinic. Later he was Professor at Genoa, and in 1911 was called to succeed Reymond at Turin. He contributed numerous writings on different subjects of Ophthalmology. Much of his early work dealt with problems of Physiologic Optics, including some important work on the axis in astigmatism. In considering cataract operations with reference to the postoperative astigmatism produced, he decided that the most advantageous method was the linear extraction of von Graefe. In experimental pathology he was among the first to successfully transmit trachoma from man to the apes. In the field of therapeutics he demonstrated that mercury could be recovered from the intraocular fluids after local applications.

His work on the microscopic examination of the conjunctival vessels during life, was an early forerunner of the recent work with the slit lamp. He showed minute changes of these vessels in diabetes, arteriosclerosis and nephritis.

He was a skilful operator and made important contributions to operative technic. He was the first to propose peripheral iridotomy in cataract operations. The method which he finally decided upon as ideal, however, was his subconjunctival method of extraction.

For some time before his death he had been incapacitated from active work by the disease to which he finally succumbed.

G. LODATO, tr. by S. R. G.

JOHN HERBERT CLAIBORNE, the New York ophthalmologist, died in New York City on May 27, of heart disease. He was born at Louisburg, N. C., June 29, 1861, son of John Herbert Claiborne, M.D., and Sara Joseph Alston Claiborne. His medical degree was received at the University of Virginia, in 1883. He at no time practiced general medicine, but, settling in New York City, began at once to treat diseases of the eye. He became ophthalmologist to the Flushing Hospital and Dispensary, assistant surgeon to the New Amsterdam Eye and Ear Hospital, clinical instructor in surgery, ophthalmic department of the Cornell University Medical College, and assistant to the chair of ophthalmology in Columbia University. He was a member of the New York Ophthalmological Society, the American Academy of Ophthalmology and Oto-Laryngology, and the American Ophthalmological So-

Daniel Buttrick Smith, 1840-1922
(See p. 844)

ciety. He was line captain, 12th N. Y. Vols., in the Spanish-American war. He wrote a good deal, perhaps his best known productions being "Theory and Practice of the Ophthalmoscope" and "The Functional Examination of the Eye."

Dr. Claiborne was a man of medium height and weight, of dark complexion, smooth-faced, and with very dark brown eyes and black hair. He was courteous and affable. Dr. Claiborne married, April 16, 1901, his cousin, Marie Louise Claiborne, of New Orleans, La., who survived him. By her he had one child, John Herbert Claiborne, Jr., now a student at Lafayette College. T. H. S.

Alberto Del Monte, after having spent much time in the study of histology and pathology under Palladino and Armanni, took up ophthalmology under de Vincentiis, in the Naples Clinic, where he continued to work until his death. Besides an active life as a clinician, he made numerous contributions to the literature of ophthalmology. His first writings were on pathologic and bacteriologic subjects; for example, The Biology of the Xerosis Bacillus, Petrifying Conjunctivitis, The Study of Amyloid Degeneration of the Lids and Conjunctiva. Other later works concerned black cataract, chancroid of the conjunctiva, ocular complications of variola; and a very complete work on chalazion, some results of which he intended to present at the Washington Congress. The last years of his life saw the completion of some important work along more general lines on the biology and physiology of the blood. He was an active collaborator in the Archivio di Ottalmologia.

Sgrosso, tr. by S. R. G.

Daniel Buttrick Smith, a well known teacher of ophthalmology at several medical schools, died on May 19, at his home, 1793 Coventry Road, Cleveland Heights, Ohio, at the age of 82 years. He was in practice until six weeks before his death, thereby completing fifty-five years of active work in his profession.

He was born at Middlebury, near Akron, O., April 30, 1840. When he was fourteen years of age his family moved to Oberlin. After being graduated from college there in 1860, he became principal of a school at Wabash, Ind. His medical degree was received at the Charity Hospital Medical College, Cleveland, in 1867. For a time he studied the eye, ear, throat and skin at Berlin and Vienna.

Returning to Cleveland, he practiced general medicine from 1867 to 1880, for the first few years of this time in association with Dr. G. C. E. Weber. During nearly the whole period of his general practice, he was personal physician to Amasa Stone, founder of Adelbert College of Western Reserve University. He was for a long time ophthalmic surgeon to the Big Four Railroad. For fifty years he was on the staffs of the Lakeside, Charity, City, Cleveland General and St. Luke's Hospitals. During forty-five years he taught at medical colleges, including the Charity Hospital Medical School, the Cleveland College of Physicians and Surgeons, and the Western Reserve School. It is said that he aided in the education of more than 10,000 doctors. Tho he taught so long, he wrote little.

Dr. Smith was a man of large, athletic build, inclined to stoutness, of florid complexion, and with light brown eyes and white hair. His customary facial expression was one of keen, quick observation, kindly good humor, and a strong will. He was a collector of books, coins and postage stamps, and an ardent lover of horses. He was often a member of the Cleveland Board of Education, and was once its president. He married, Nov. 17, 1868, Miss Jeanette Chiday, who died in 1914. Dr. Smith leaves no kin. T. H. S.

ABSTRACTS

Mazzei, A. Milk in Ocular Therapy. Arch. di Ott., 1921, v. 28, p. 131–154.

The author reviews briefly the literature on the use of milk in ophthalmolbgy. It was first used by Müller and Thanner at Vienna in 1916, the injections being given intravenously and subcutaneously. Darier began to use it soon after this and believed its effect to be due to stimulation of leucocytosis and phagocytosis. A number of very favorable results in all kinds of inflammatory conditions of the eye have been reported. One unfavorable report is that of Berneaud who, after 905 milk injections, reported little good effect in cases of interstitial keratitis, phlyctenular keratitis, trachoma, iritis, or choroiditis.

The use of milk injection as a prophylactic measure against infection after perforating injuries or before operation has been reported favorably by Van Lint, Weekers and Bolone. Experimental evidence in support of its effectiveness was given by Müller in 1918, who showed that it produced a definitely stimulating effect on bone marrow, and leucocytosis in animals. The author used fresh cow's milk which had been boiled four minutes. He injected about 4/10 to 1 c.c. subconjunctivally, repeating this as soon as the milk was seen to have absorbed, usually after two or three days.

He reports 16 cases of phlyctenular conjunctivitis and keratitis treated by this method, in which the only other treatment was hot applications. These cases all cleared up after two or three injections in the course of 2 to 7 days, without complications. In three cases of interstitial keratitis, he found that milk injections had no effect. In six cases of trachoma with pannus, the infiltrations cleared up and the pannus cleared up almost entirely in the course of from one to three months. The symptoms of pain were much relieved from the first. There was no effect on the lesions of the lids. In his cases, the favorable effect was seen to be proportional to the amount of local reaction obtained. S. R. G.

Niosi, F. Cystic Lymphangioma of the Orbit, Arch. di. Ottal., 1921, v. 28, p. 219–246.

The author's patient was a woman of sixty. Fourteen years before she had noticed a tumor, the size of a pinhead, at the internal angle of her right upper lid. Operation was refused at this time, and the tumor gradually increased, producing exophthalmos. Antispecific treatment was given several times with temporary improvement. The tumor remained stationary for some years and gradually increased again. At her last appearance, her Wassermann was negative and she presented no other evidence of tumor elsewhere.

At this time, the orbital tumor was of immense size; the eye was pushed down and out as far as the junction of the lower and middle third of the nose, and the tumor had extended up and out on the brow. The visible part of it was the size of an orange. It was smooth and compressible. There was no pain. Vision was bare light perception, and movements of the eye were almost abolished. Sixty-five c.c. of fluid was removed from the tumor with a needle, and proved to be full of fat globules, degenerated cells and cholesterin crystals. The growth filled up again rapidly and extirpation under local anesthetic was done, the whole mass being dissected out in toto. It proved to be entirely outside the muscle cone and the muscles were left intact. It extended to the apex of the orbit. Healing was normal. The exophthalmos almost entirely disappeared and good motility was restored, altho there was naturally no effect on the vision.

A careful pathologic examination was made and disclosed a number of *cysts* of variable sizes with a connective tissue wall 2–8 millimeters thick. The stroma, including the cyst walls, was made up of connective tissue with some elastic fibers, deposits of calcium, and a few areas showing true bone formation. The characteristic feature was the cysts, which were lined with endothelial cells and which showed in

their walls numerous nodules of actively proliferating lymphoid tissue. These were not foci of inflammatory tissue but true lymph follicles. In some of these, which had become more rarefied in structure, fissures were found and these were becoming lined with flattened lymph cells. This, the author believes, explains the genesis of the larger cysts from this lymphoid tissue. Foci of epithelioid cells and a few giant cells were also found. The cysts contained a coagulated reticulum full of lymphocytes, the residue of lymph. An interesting point is the fact that some blood was removed with the fluid by aspiration, which might have led to the diagnosis of hemangioma. In view of the histologic findings, however, the diagnosis of true lymphangioma is certain, the blood having evidently been obtained from rupture of a blood vessel into the cyst. Nine cases of lymphangioma have been reported, and in none of these was the exophthalmos as extreme as in the author's case. Five drawings and a bibliography were included. S. R. G.

Schott, K. Socalled Coloboma of the Macula. Klin. M. f. Augenh., v. 67, 1921, p. 415.

Schott describes two cases of coloboma of the macula in sisters of 7 and 8 years. A brother of the father had the same affection, and three out of five children of the father's second brother were reported to have poor sight and nystagmus. In both cases, the visual fields were concentrically contracted for white and colors, no scotoma. The borders of the horizontal oval foci, of symmetric location were very sharp and intensely pigmented. The interior was, in one case, yellowish red, in the other white, and filled with irregular figures of pigment and remnants of the choroidal plexus. It was slightly excavated as shown by parallax. In the left eye of the younger sister, a larger retinal vessel coursed over the focus.

So far a family occurrence of coloboma has not been described. Perhaps this family congenital eye affection, which does not prove to be of hereditary nature, may be explained by Elschnig's theory of a localized proliferation of both strata of the secondary ocular vesicle at the posterior pole, an active process of the ectoderm thru which the normal development of the descendents of the mesoderm were damaged as the final malformation showed. C. Z.

Wachtler. Therapy of Vernal Conjunctivitis with Afenil. Klin. M. f. Augenh., 1921, v. 67, p. 446.

Encouraged by the striking case of vernal conjunctivitis treated by Cords with intravenous injections of 10 c.c. of 10% afenil (chlorid of calcium urea) Wachtler tried this in 3 cases. Only one could be observed for sufficient time, viz., a man aged 19, in whom the conjunctiva of the upper lid showed the characteristic papillary hypertrophy while the limbus presented no changes except increased injection. After 9 days the conjunctiva was almost smooth, and the distressing symptoms had entirely disappeared. C. Z.

Cramer, E. Thrombosis of Central Retinal Artery with Swelling of Disc after Influenza. Klin. M. f. Augenh., v. 66, 1921, p. 488.

A man, aged 47, lying ill with influenza, suddenly noticed a contraction of the visual field of his left eye, leading in 3 days to complete blindness. The optic disc was very much swollen, snow white, borders indiscernible, as the disc was surrounded by an extensive greyish white opacity of the retina. Vessels not different from those of the right eye, but on the disc of the opaque retina small irregular hemorrhages, and at the center a cherry red spot.

Cramer assumed an arteritic thrombosis of the central artery from the influenza infection, far behind the visible portion. Since, beyond the lamina cribrosa both vessels lie close to each other in a sheath, the secondary moderate thrombosis of the vein in connection with the pressure of the closed artery did not lead to the classical picture, but to a stasis evidenced by the

swelling of the disc. After 3 weeks, the disc was atrophic. Vision returned to counting fingers at 1 1/2 mm. excentrically. C. Z.

Sidler-Huguenin, H. Ocular Syphilis in Second Generation. Klin. M. f. Augenh., v. 66, 1921, p. 44.

In all, 36 hereditary luetic families with 65 children were so carefully examined that certainly nothing pathologic could escape. Their statistics are superior to former ones by the additional serologic and roentgenologic examinations. In 22 families with 48 children, the mother, and in 14 families with 17, the father was an hereditary syphilitic. In 36 marriages 14, i. e., 28% or 1/3 of all 50 marriages, remained without children. Thus the procreation in hereditary luetics is very considerably diminished. The male sexual gland is more damaged by hereditary lues than the female. In the 64 children examined, no changes characteristic of syphilis could be ascertained. In a few cases, dystrophies were observed, which, however, cannot be considered as specific, especially in children of poorly nourished families of laborers. The statistics were taken from 2/3 policlinic and 1/3 private patients. The author urges Wassermann test before every marriage, in order to institute energetic antiluetic treatment, if positive. If the man is an hereditary luetic, the chances for healthy children are greater. C. Z.

Kreiker, A. Microscopic Findings in Ocular Conjunctiva and Genesis of Pannus. Klin. M. f. Augenh., 1921, v. 67, p. 235.

Kreiker excised, in 11 cases of trachoma, pieces of ocular conjunctiva 8 to 10 mm. long and wide immediately above the limbus, and treated them according to the usual methods for microscopic examination. In two cases without pannus, these apparently normal pieces of conjunctiva revealed normal, smooth epithelium. Immediately under it was a firm plasma cellular infiltration 60 to 100 μ thick, not sharply defined toward the submucosa, somewhat accumulated around the vessels.

These cases showed that the process advances more or less gradually from the fornix. At a given moment the parts above the limbus are infiltrated but the cornea not reached, as the limbus on which the loose subepithelial tissue ceases arrests the progress. After breaking this obstruction, the cornea becomes involved and pannus develops. According to these observations, the point of attack lies in the connective tissue, not in the epithelium. C. Z.

Geis, F. Acute Parenchymatous Keratitis in Epidemic Parotitis. Klin. M. f. Augenh., 1921, v. 67, p. 67.

In contrast to other cases published, Geis saw in a girl, aged 10, affected with left sided epidemic parotitis, an acute isolated parenchymatous keratitis of the left eye, without participation of the uvea, which healed after 6 days. The formation of streaks, the equally concentric clearing from the periphery, and the sudden disappearance of the opacity indicated its origin from effusion fluid into the parenchyma, due to toxic infection, similar to that in influenza. C. Z.

Davids, H. Actinomycosis of the Cornea. Klin. M. f. Augenh., 1921, v. 67, p. 69.

In the center of the left cornea of a woman, aged 30, was a striking white spot of from 1 to 1.5 mm. in diameter, sharply defined, of finely granulated surface. Under the loupe it looked like a fine compressed blossom of 3 leaves. The lower half of the cornea was occupied by an adherent leucoma. The deposit was easily removed with a knife.

After treatment with hydrochloric acid, it consisted of typical glomerulus bodies in form of an actinic wreath, of homogeneous contents. There were no mycelia, and cultures did not grow, showing that these bodies were dead. The bodies must be regarded as a reactive product of the organism. The actinomyces was probably aerobic, as it presented no inclination to grow into depth.

The clinical picture of corneal actinomycosis is variable. It does not

lodge in the intact cornea, according to the experience in actinomycosis of the lacrimal canaliculi, but only after injuries of the cornea. In this case the corneal tissue, changed by disease, offered little resistance to its invasion.

C. Z.

Leslie Paton. Tabes and Optic Atrophy. British Journal of Ophth., 1922, vol. 6, p. 289.

On looking over a series of visual fields in tabetics, one cannot help being struck by the remarkable variability that they show, and the marked disproportion that exists in different cases between the loss of visual acuity and the loss of visual field. Is there anything in the underlying pathologic changes which will explain this variability?

The author discusses this question in great detail. A summary of his pathologic conclusions is that the toxin was always a purely hypothetic substance, evoked to explain degenerations taking place where no active organisms could be found. In the light of the work of Noguchi, Levaditi, Mott, Head, Fearnsides, McIntosh and Fildes, it must now be allowed that all the manifestations of syphilis are due to the local production of toxins in the presence of the spirochete, but that the reaction between the spirochetes and the tissue varies at different periods and in different tissues, either because of a diminution of the number and virulence of the spirochetes, or because of differences in the resisting power of the tissues to the action of the toxin. There still remains, however, the unsettled question as to whether this locally produced toxin acts directly on nerve tissue, producing a parenchymatous degeneration, or primarily on connective, vascular and lymphatic tissues, with a consequent secondary nerve degeneration; or a third possibility, that the nerve degeneration and the connective tissue degenerations are coordinate results due to the presence of the spirochetes in both tissues.

Often, disturbance of dark adaptation, precedes the smallest obvious change in visual acuity, fields or color sense.

Uhthoff's, and also Stargardt's classifications of the visual fields are discussed. Eleven fields accompany the contribution, illustrating the various classifications. Eight of these are from the author's own work.

D. F. H.

Saint Martin, de. Pemphigus of the Conjunctiva and Heredosyphilis. Ann. d'Ocul., 1921, v. 158, p. 338–349.

After reviewing the history of conjunctival pemphigus and the theories concerning it, the author reports a case of a woman of 24, where the lesions first appeared at the age of 15 months. She had had several operations, probably for trichiasis. Her appearance was typical of heredosyphilis. Her eyes showed corneal and palpebral changes characteristic of pemphigus in different stages of evolution, more pronounced in spite of the typical pemphigus history. No other part of the body showed any lesion. The first treatment was to correct the position of the lid margins and to treat the trichiatic keratitis. A Wassermann was strongly positive, so, later, 40 intravenous injections of mercury cyanid were given, which were followed by 4 injections of neosalvarsan. This was followed by treatment with Gilbert's syrup. During the period of treatment there were no exacerbations, the general health improved and the local condition was satisfactory. Then the patient was not seen for 5 years, during which time the treatment was neglected. When seen again, there were exacerbations of the local condition, but these yielded to Gilbert's syrup and then became stationary.

C. L.

Bourguet. Operative Technic for Dacryocystitis without External Scar. Soc. de Méd. de Paris. Abst. Gaz. des Hôp., 1922, v. 95, p. 829.

The method has been used on 18 cases, with good results in 16. It consists in detachment of the nasal

mucosa of the ascending branch of the superior maxilla and both surfaces of the inferior turbinate, resection of the anterior half of this bone, and opening of the bony lacrimonasal canal at its inferior part. Opening from below upward of the entire internal part of the canal. Ablation of the entire internal wall of the membranous canal and of the sac, guided by a probe introduced thru the lacrimal passageway, suture of the detached nasal mucous membrane. C. L.

Holth, S. Microscopic Examination of Subconjunctival Scars after Sclerotomy for Glaucoma. Norsk. Magazin for Laegevidenskaben, vol. 82, p. 717.

The author reports the microscopic findings in the eyes of six cases of chronic glaucoma, which he had operated 5 mos. to 6 yrs. previous to death. In each case sections show actual fistulæ to be present. Some cases, too, showed the conjunctiva over the scleral defect to be very thin and, possibly, containing a secondary fistula. This thinning of the conjunctiva he attributes to extensive scar formation under the conjunctival flap, and therefore he advises that, in operating, the conjunctiva should be dissected away over as small an area as possible. D. L. T.

Guist, G. Reaction of Light and Dark Irides to Homatropin and Atropin. Wien. med. Wöch., 1921, no. 24, p. 1055.

All light irides contain crypts and can be paralyzed with homatropin. The dark irides are only sparingly endowed with crypts, but dilatation is possible with homatropin. Dark irides without crypts do not react with homatropin but can be paralyzed only with atropin. H. A.

Hanke, V. Double Perforation of the Eyeball and the Traveling Retrobulbar Fragment of Iron. Wien. med. Woch., 1921, no. 24, p. 1058.

Hanke reported a case of a boy, in whom a small fragment of iron entered the cornea and posterior wall of the eyeball, and was arrested in the sheath of the optic nerve at its entrance into the sclera, and had in the course of a few weeks taken a lower position of several mm. and outward, and descended then downward toward the nose. The course of the splinter was observed by means of Roentgen pictures. H. A.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. Joseph J. Duncan, Jr., of Pittsburgh, died July 27th, aged fifty, at the Presbyterian Hospital.

Dr. George M. Gould, of Atlantic City, died at his home, after an illness of three hours from heart disease, August 8th, aged seventy-four. He occupied a very conspicuous position as an American ophthalmologist, and was specially noted for his writings on errors of refraction as the cause of migrain and other nervous disorders.

Dr. Frank Wilson Martin of Lansing, Michigan, died July 17th, aged sixty-three.

Dr. Juan Santos Fernandez, of Havana, Cuba, died August 6th.

PERSONALS.

Dr. Rene Rousseau has been appointed Chief of the Ophthalmic Clinic at Angers, to succeed Dr. Bichon, deceased.

Dr. Thomas A. Woodruff has resumed the practice of ophthalmology at New London, Conn.

Dr. Myles Standish has announced his retirement from active practice of ophthalmology.

Dr. Virgil Wescott of Chicago, son of Dr. Cassius Wescott, entered into partnership with his father September first.

Dr. A. Maitland Ramsey, of Glasgow, has been appointed President of the Ophthalmological Society of the United Kingdom, for 1922-23.

Dr. A. S. Percival, of Newcastle-on-Tyne, has been appointed President of the Section of Ophthalmology of the British Medical Association.

Dr. Komoto of Tokyo, Japan, retired March 22, 1922, as professor in the Imperial University of Tokyo. His successor is Dr. Ishiwaga.

Dr. L. Webster Fox, of Philadelphia, sailed in July for Scotland, where he will read a paper before the annual convention of the British Medical Association at Glasgow.

Dr. John C. Dye, formerly of Statesville, N. C., has sailed for Honolulu, where he will have charge of the eye department of the Tripler General Hospital.

Dr. O. E. Fink of Danville, Illinois, has been appointed visiting oculist and aurist to the Danville branch of the National Home for Disabled Volunteer Soldiers.

Dr. N. Bishop Harman, London, has been elected a corresponding member of the Société Nationale des Sciences Naturelles et Mathematique de Cherbourg in recognition of his researches into the origin of the facial musculature.

Dr. George W. Jean of Santa Barbara, California, was host at the May meeting of the New York Ophthalmological Society which was held at Delmonico's. This was the 492nd regular meeting of this society.

SOCIETIES.

The American Academy of Ophthalmology and Oto-Laryngology will hold its 27th annual meeting in Minneapolis and St. Paul, Sept. 19 to 23, inclusive. The regular program, which will begin on Tuesday morning, will be followed by the Section on Instruction on the 22nd and 23rd of September. Special fare rates on the certificate plan will be issued by the Railroads.

MISCELLANEOUS.

The New York Association for the Blind has been left $65,000 by the will of Mrs. Mary Kingsland.

The Unity Hospital, Brooklyn, has acquired ground for the purpose of erecting a modern institution devoted to the treatment of diseases of the eye, ear, nose and throat, and oral surgery. The building will be four stories high and equipped with modern facilities.

At the annual meeting of the Iowa Association for the Blind, at Binton, a corporation was established to be known as the Iowa Foundation for the Blind. The purpose of the foundation is chiefly to raise money to be lent to worthy young blind persons who wish to enter business for which they have been fitted but lack capital. *Jour. A. M. A., Aug. 5, 1922.*

At the meeting of the executive committee of the American Red Cross in June, the sum of $12,000 was made available for making capital loans to blinded exservice men during the fiscal year ending June 30, 1923. These

loans are for the totally or partially blinded soldiers who wish to establish themselves in a small business. *Jour. A. M. A., Aug. 12, 1922.*

The Wintersteiner Collection of 13,000 microscopic preparations of pathologic changes in the eye has been acquired by the St. Louis University thru the generosity of Mr. Charles Rebstock of St. Louis. This collection, which is said to be the most complete in Europe, will be utilized for graduate instruction in ophthalmology. *Jour. of the A. M. A., Aug. 19, 1922.*

The Eye, Ear, Nose and Throat Hospital, New Orleans, will move into a new building on Tulane avenue. When the new, four-story, fire proof building is completed, the accommodations will represent an outlay of $500,000. Donations from various people have made this possible, $100,000 being given by Isaac Delgado, $20,000 by A. C. Hutchinson, $6,000 by Thomy Lafon, the negro philanthropist, and $50,000 by Mrs. John Dibert. Dr. Henry Dickson Bruns is surgeon-in-chief. He succeeded the late Dr. DeRoaldes, founder of the institution.

The Eye Sight Conservation Council of America, New York City, is establishing a special mailing list for lecturers and writers interested in the subject of conservation of vision. Data and material will be prepared and issued periodically to persons whose names are on the special mailing list. There is need for lecturers who will appear before local organizations, such as Rotarian and Kiwanis Clubs, chambers of commerce, schools and colleges, to present the subject of conservation of vision. *Jour. A. M. A., Aug 26, 1922.*

The Mississippi Association for the Blind, permanent organization of which was effected August 4, at Jackson, plans to make a survey to determine the number of blind persons in the state and the cause of blindness in each case. A social worker will be provided to make interviews and ascertain individual needs of the blind. The organization hopes to wage an educational war for the prevention of blindness and the conservation of vision, to assist the state board of health in stamping out diseases that cause blindness, and to help enforce the laws on the care of babies' eyes. *Jour. A. M. A., Aug. 26, 1922.*

The first training course in eye conservation ever given for teachers under the auspices of an American university was opened recently at Columbia University, with a class of twenty-one. A feature of the course is an observation class composed of children from New York City schools, whose defects of vision have placed them in the sight-saving classes. Dr. Robert R. Irwin, supervisor of the sight-saving department of the public schools of Cleveland, is general director of the Columbia course. A committee, composed of representatives of city, state and national organizations, which is cooperating with Columbia in the arrangement of these courses is headed by Dr. Thomas J. Riley. *Jour. of the A. M. A., July 29, 1922.*

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Birkhaueser, R. Basis of test types. Klin. M. f. Augenh., 1922, v. 68, pp. 732-738.

Coppez, H. Electric lamp for diagnosis of diplopia. (1 ill.) Bull. de la Soc. Belge d'Opht. 1922, No. 45, pp. 24-26.

Kearney, J. A. Value of eye observations in fractures of skull and head injuries. New York State Jour. Med., 1922, v. 22, pp. 341-344.

Strebel. Test for acuteness of vision. Schweiz. med. Woch., 1922, v. 52, p. 456. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-23).

Repeated title. **Lauber, H.** (A. J. O., 1922, v. 5, p. 514.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-21).

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Beaumont, W. M. Butyn versus cocain. Lancet, Aug. 5, 1922, p. 304.

Cassimatis. Therapeutic value of milk injections in ocular disease. Bull. Ophth. Soc. Egypt, 1921, p. 65.

Fernandez, R. Radium therapy in eye, ear, nose and throat work. Jour. Philippine Islands Med. Assn., 1922, v. 2, p. 116.

Harris, S. J. Standardizing use of constant current in ophthalmology. Amer. Jour. Electrother. and Radiol., 1922, v. 40, p. 143. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-11).

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Schwarzkopf, G. Optochin iontophoresis and ultraviolet light therapy. Zeit. f. Augenh., 1922, v. 48, pp. 77-89.

Triebenstein, O. Metallic silver in eye after instillation of electrocollargol. Klin. M. f. Augenh., 1922, v. 68, pp. 749-752.

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Wick, W. Fixation forceps in enucleation. (3 ill.) Klin. M. f. Augenh., 1922, v. 68, pp. 780-783.

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Elschnig, A. Myopia. Med. Klin., 1922, v. 18, pp. 683-685. Abst. J. A. M. A., 1922. v. 79, p. 417.

Harris, S. J. Correction of refraction without glasses. Amer. Jour. Electrother. and Radiol., 1922, v. 40, pp. 246-255.

Hubbard, C. H. Protest against nonrecognition of optical defects. Hahnemann Monthly, 1922, v. 57, pp. 470-472.

Mazzei, A. Size of retinal image and optical correction after removal of unilateral cataract. Arch. di Ottal., 1922, v. 29, p. 224.

Thomson, E. Estimation of refraction without a cycloplegic. Brit. Jour. Ophth., 1922, v. 6, p. 379.

OCULAR MOVEMENTS.

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Papillon, P. H., and Lestoquoy, C. Congenital familial nystagmus with albinism. Bull. Soc. de Pediat. de Paris, 1922, v. 4, p. 128. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-37).

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Young, G. Subconjunctival advancement. Brit. Jour. Ophth., 1922, v. 6, pp. 323-324.

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Danis, M. Atypical coloboma. Bull. de la Soc. Belge d'Opht., 1922, No. 45, pp. 34-36.

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INJURY TO CORNEA AND CONJUNCTIVA DUE TO FISH BILE.

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An allusion to the effect of fish bile on the eye is quoted from ancient literature, and a case of injury to the cornea and conjunctiva by this fluid is reported. Experiments with bile from fish and the ox showed that in the rabbit bile caused loss of corneal epithelium, but the permanent opacity developed in a patient seemed not to be a necessary result, being rather due to lead collyrium. Reported from the Massachusetts Charitable Eye and Ear Infirmary.

The road of science is a tortuous one, that twists and turns and not infrequently crosses some of the most ancient footpaths. We were, therefore, much interested to discover, when we had completed the studies that are the subject of this paper, that our ideas had been anticipated by an ancient observer some two thousand years ago. In the Book of Tobit (II, 9 and 10), the story is told how Tobias, the father, became blind thru getting some bird droppings in his eyes, and his eyes were covered with white films. But his son obtained some bile from a fish of the Tigris river and he (Book of Tobit XI, 10-13) "ran unto him, and took hold of his father; and he strake the gall on his father's eyes, saying, Be of good cheer, my father. But when his eyes began to smart, he rubbed them; and the white films scaled away from the corners of his eyes; and he saw his son, and fell upward on his neck."

In modern medical literature, however, we have found no record of such a procedure. We wish, therefore, to report the following case, together with some experiments on animals.

REPORT OF CASE.

S. D., fisherman, aged 26, while opening a codfish allowed some bile to spurt into his eye. He says it hurt and burned severely, but he did not wash it out for several minutes. Twenty-four hours later, he came to the Eye Clinic, having meanwhile used a weak solution of lead acetat as an eye wash. His eye was found to be markedly congested. The nasal half of the cornea was slightly hazy, its surface was denuded of epithelium and could readily be stained with fluorescein. The neighboring bulbar conjunctiva was swollen and congested, and also stained with fluorescein over a large area. There was marked photophobia and lacrimation. A boric acid —zinc sulphat collyrium was prescribed and he was allowed to go home.

He returned one month later, stating that the inflammation had rapidly subsided but complaining of some impairment of vision. Covering almost the whole nasal half of the cornea, there was a milky, sector shaped opacity, having its apex in the pupillary zone. Everywhere the opacity was covered by glistening epithelium. A false pterygium had formed at the limbus, and fine grayish bands of scar tissue extended a short distance into the conjunctiva about it. V. O.D. 20/30. V. O.S. 20/20+.

EXPERIMENTAL.

Being loath to believe that bile could so injure the cornea, we experimented on rabbits and found that both fresh fish bile and prepared ox bile (Fel bovis U.S.P.) readily denuded the cornea of its epithelium.

Experiments 1 and 2. A small drop of fish bile was placed, with the aid of a wire loop, on the cornea of a rabbit, the eye meanwhile being held open by a speculum. After 5–10 minutes there

was a slight haziness of the area touched by the bile. The epithelium became swollen, lost its luster, and could very easily be wiped off. Twenty-four hours later, the area appeared as a smooth, sharply outlined erosion which stained deeply with fluorescein. In another twenty-four hours, the area was entirely clear and completely grown over by epithelium. Not the slightest conjunctival reaction was produced, and no permanent opacity developed.

This experiment repeated with ox bile instead of fish bile, gave identical results.

Experiment 3. To obtain a conjunctival reaction in any way comparable to that of the case reported, we found it necessary to keep the rabbit's conjunctival sac flooded with bile for several minutes. There followed then, shortly, a marked chemosis of the conjunctiva with considerable congestion and some demonstrable loss of conjunctival epithelium, the corneal reaction being as described above, except that with this prolonged exposure a slight diffuse superficial corneal haze developed.

Experiment 4. We repeated the procedure of experiment 3 on another rabbit, but in addition washed the eye several times in the next twenty-four hours with a 2% solution of lead acetat. A very dense and permanent milky opacity developed.

DISCUSSION.

Our experiments would seem to show that whereas the primary injury in the case reported was due to bile, the permanent corneal opacity which developed resulted from the use of a lead acetat wash rather than from the bile itself.

With the demonstration that bile can remove the corneal epithelium without injuring the underlying stroma, certain possible therapeutic uses suggest themselves.

On account of its bactericidal and solvent properties, bile was long ago suggested for the treatment of ulcus serpens,* but owing to the fact that in this condition the organisms are lodged deep in the stroma quite beyond the reach of the bile, no favorable results were to be expected, nor were they obtained.

In the course of certain studies by one of us†, we attempted to discover any possible therapeutic value of the local application of bile in experimentally produced herpetic keratitis in rabbits. We inoculated, by scarification, both corneae of a rabbit, with the virus of herpes. Both inoculations were made at the same time, from the same source, and in a way which we had found to result quite constantly in an approximately equally severe affection of the two eyes. Twenty-four hours later, a cotton swab soaked in bile was gently rubbed along the whole streak of inoculation of one eye. This eye subsequently developed the characteristics of experimental herpetic keratitis to a much more severe degree, and with a much denser and larger resulting permanent opacity than did the control eye. We would, therefore, regard the use of bile in herpetic or dendritic keratitis as definitely contraindicated.

It remains to be seen whether or not bile could be helpfully used in certain special conditions, where it is desired to remove areas of diseased corneal epithelium without injuring the underlying stroma. Our experience with experimental herpetic keratitis would indicate, that before using bile in such cases, one should be very sure that there were no pathogenic organisms present ready to attack the injured or exposed cells.

The case reported, together with our experiments, furnishes a striking example of the well known dangers that lie in the use of lead eye washes. We feel strongly that these washes should be eliminated from ophthalmic therapeutics.

*See American Encyclopedia of Ophthalmology under "Bile."

†Friedenwald—to be reported elsewhere.

ENUCLEATION AND PROTHESIS.

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The behavior of organic implants living or dead is here discussed, and a case reported in which it was considered best to remove the piece of cartilage that had been implanted in the orbit nine months before. In another case, there had been no unfavorable effects from such an implant after eighteen months. Read before the Cincinnati Ophthalmological Club, May 11, 1922.

Grafting and transplanting organic tissues, both autoplastic and heteroplastic, has been known and practiced for several centuries, but only in recent years has it been used universally and extensively. Still more recently, pieces of living or dead organic tissues have been used as inserts in the enucleated or eviscerated orbit to act as a prothesis.

Inert inorganic substances such as glass or gold, if tolerated, become encapsulated. Even then, after a variable period, they may be expelled by a local inflammation, or the thinning of the tissue wall between them and the artificial eye. Inclusions of dead or living organic tissues, once admitted, as a rule are not expelled. Under strictly aseptic conditions, living organic tissues, as free grafts (separated from their original blood and nerve supply) may continue to live as the same tissue in their new sphere. But, as a rule, all free grafts, possibly with the exception of skin grafts, die; in which event they act in the same manner as dead inserts. Large groups of animal cells are able to live for a time when separated from all connection with their vascular and nervous supply, but they usually die as nourishment cannot reach the center by imbibition.

	Percentage of Inorganic content	Percentage of Organic content	Calcium percentage of Inorganic content
Mammal bone	34.56%	65.44%	40.13%
Mammal cartilage	25.00 to 30.0%	1.5 to 2.2%	7.88%
Mammal muscle	20.8 to 20.5%	0.9 to 1.0%	0.04%
Mammal fat	0.04%	trace	trace

Tendon, muscle, fascia and fat grafting of living tissue is rarely successful, unless the blood and nerve supply is carefully preserved. Bone and cartilage grafts are said to unite readily; but I believe these tissues also die, as a rule, and it is their organic framework that maintains the size of the original insert without shrinkage. The process of new connective tissue in growth of this bone and cartilage goes on. Osteoclasts which are present break down the proteid substances and absorb them; while osteoblasts, possibly with the aid of the calcium on hand, build a new bony structure in the inorganic framework.

We find that all necrotic organic tissues have the tendency to attract and lay down calcareous and osseous material, whether it be dead transplants, phthisical eyes, sclerotic arteries, or tuberculous lungs. Magitot has found that dead organic tissues are adopted and young osseous cells are seen to appear in them, and in the course of time a bony framework results.

It would seem that two distinct advantages would accrue from the employment of those tissues having the highest calcium and inorganic content, in that calcium salts in abundance are at hand and a scaffolding on which to build is available.

The following shows the inorganic, organic, and calcium percentage of different mammal tissues:

From this it would appear that first bone, then cartilage, would be by far the best material to use, in that they have the highest inorganic and calcium content and are the least absorbable.

I wish to present three microphotographs of sections from a specimen of intercostal (hyalin) bovine cartilage implant.

When Dr. Ayres came home from

France after the war, he brought with him the ideas and technic of Dr. A. Magitot in the use of ox cartilage as a prothesis. He suggested that I try implanting this cartilage in some cases, to see what results I would get.

The cartilage used was taken from the sternum of a young ox, between the insertions of the ribs, and kept in 65 per cent alcohol. Magitot now keeps this tissue in 10 per cent formalin solution. At the time of use, the cartilage was steam sterilized and cut down to about one-half the size of the eye to be enucleated.

Fig. 1.—Normal intercostal bovine cartilage.

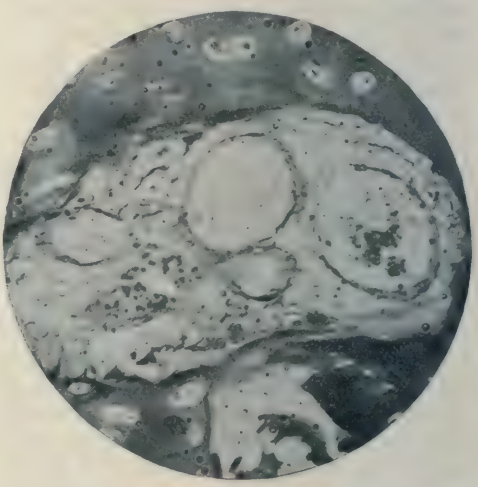

Fig. 2.—Showing group of blood vessels, necrotic cartilage and tissue invasion.

The microphotographs are all from the same piece of cartilage. The first one is of a part which was cut off at the time of operation. The second and third are pictures of a section of the cartilage removed from the orbit, nine months after its insertion at the time of enucleation.

This insert, after removal from the orbit, was sent to Dr. Austin of the pathologic department of the Cincinnati General Hospital for diagnosis. His report is as follows: "Specimen consists mainly of cartilage, for the most part uninjured, but showing connective tissue ingrowth with blood vessels, principally along one edge of speciment; a few small areas of bone formation are to be noted." Fig. 2.

This same section, along with the section of original cartilage, was examined by Drs. Malone, professor of histology of the Medical College of the University of Cincinnati, Goosman and Noonan, who concurred in the diagnosis of tissue necrosis with fibrous infiltration and beginning bony formation.

In the removed insert, four stages may be seen. First, the original unchanged cartilage; second, necrotic cartilage; third, calcification; fourth, signs of ossification. The tissue, had it remained, would probably in the course of a year turned thruout into true bone.

The advantages of the operation are as follows:

1. There is insured a better fixing point, presenting a convex instead of a concave or flat surface.

2. Muscle action, as a rule, is infinitely better.

3. There is less shrinkage of the orbital contents and retraction of the lids.

4. There is no interference with growth of the orbit in those who have not reached adult development.

Probably the only contraindication is sympathetic involvement of the opposite eye, and this is still a mooted point.

A word about the patient from whom the implant was taken may not be amiss. On May 27, 1917, while removing a towel from the branch of a tree, the branch sprung back, striking the patient across the face, leaving a thorn imbedded in his right eye. The

thorn was removed at the time, with no other treatment. Since then there has been rapid loss of vision in the right eye, with gradual loss in the left. When I saw him shortly before operation, the right eye was phthisical, with an opacity of the lens. The veins of the left eye were engorged somewhat, and the disc outline was rather indistinct. The pupil (left) reacted to light. The patient said that he had shooting pains thru the left eye at times, and the right eye pained him constantly.

Fig. 3.—Fibrous infiltration with beginning bone formation.

The right eye was enucleated January 29, 1921, and a piece of cartilage included in Tenon's capsule. The recti muscles were brought over the stump and united with catgut. The conjunctiva was brought together with a double purse-string of silk. Both eyes were bandaged for two days. There was very little reaction or swelling. The left eye ceased paining him, and the vision with a small cylinder was 20/20.

He returned again in the fall with pain in the left eye, and altho I could find no signs of trouble in the eye, I thought it best to remove the cartilage. This was done October 23, 1921, nine months after its insertion.

The removal of this cartilage was quite difficult, as it was bound down and penetrated by orbital tissue. It was held with a tenaculum and finally dissected out, more or less piecemeal. The removal of the insert took much longer than the entire enucleation and insertion operation.

The pain remained in the eye two or three weeks longer, and then gradually disappeared. When last I saw the patient, some two months ago, there was no pain in the left eye and vision remained 20/20.

Another one of these insertion cases, who has retained the cartilage for twenty-one months, is here for demonstration. This man was struck in the right eye with a bayonet while going under a tent in March, 1919. When I saw him, August 1, 1920, he was suffering very much from pain and headache. Examination showed a large staphyloma protruding from between the right eyelids, which included the cornea with the incarcerated iris and the lower outer segment of the eye. The left eye was negative in all respects. The enucleation and implant operation was done August 18, 1920, with the immediate cessation of all pain. The left eye since then has remained normal.

Five cases, two of which have been presented this evening, have been operated by me in this manner. So far as I know, these inserts have remained in place, practically unchanged in size. There has been no postoperative trouble of any kind. The recoveries have been rapid and uneventful. The cosmetic results are probably better than could be had with the simple enucleation operation.

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OBSERVATIONS IN A CASE OF LIPEMIA RETINALIS.

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A case is reported in which the ophthalmoscopic appearances characterising this condition were under observation for more than three months, during which time they became normal. The accounts of cases previously reported are here referred to, and it is suggested that the condition is not so rare as the literature would indicate The vision usually remaining normal, no ophthalmoscopic examination is made Read before the American Ophthalmological Society, May, 1922.

The striking and unusual picture of lipemia retinalis and the comparative dearth of literature with regard to the subject, makes important the necessity for recording such cases when one has the good fortune to see them.

That the condition is rare is evident from the fact that only two papers, relative to the subject, have appeared in the Transactions of this Society; the first by Heyl in 1880, and the second by Hardy in 1921.

At the risk, therefore, of a repetition of some of the features of the paper by Hardy, whose opportunity for a complete metabolic study was so unusual, and for the purpose of showing the varying color changes in the vessels which I was permitted to watch for a longer period than has been the privilege of most observers, I desire to add to the records of this Society a case history in which it was possible to observe the color changes in the vessels for a period of three months, and to note the gradual return to normal as the fat content of the blood was reduced.

At the outset it should be stated that it was not possible, as was done in Hardy's case, to make a complete diagnostic study of the condition. The patient's mental attitude, particularly with respect to the medical profession, was such that no persuasion on my part could induce him to either enter a hospital or to take treatment; and he was not intelligent enough to carry out, at home, the usual dietary restrictions.

The changes to be described were, therefore, not influenced by any scientifically directed measures for the relief of the underlying condition, namely, diabetes mellitus. The case history is as follows:

CASE. J. C. W., aged 33, was referred on November 10th, 1921, with request that an examination be made of the eyegrounds. The patient, an extremely emaciated, blond male, stated that up to the year 1919, when he developed diabetes, he had been free from any physical disability with the exception of a mild attack of gonorrhea during his younger days. He denied syphilitic infection.

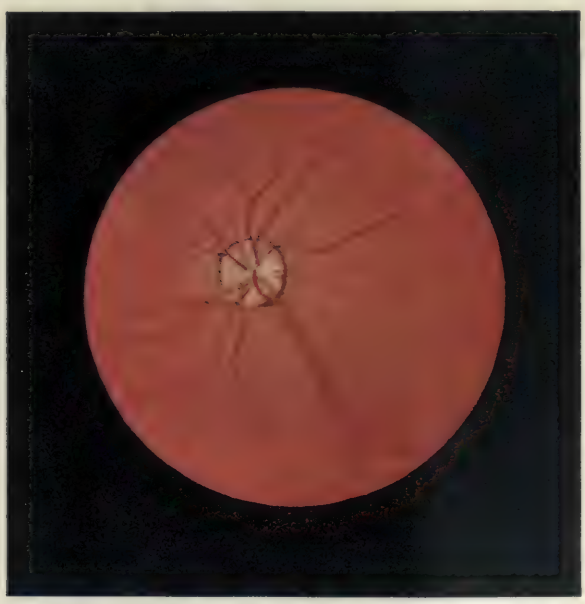
He was drafted into service when the United States entered the world war, and passed the usual physical examination. Before being discharged, he developed diabetes and was sent to an army hospital at Ft. McHenry, where he remained for three weeks, leaving the institution because, as he expressed it, he "would rather die from the disease than be starved to death."

His present symptoms, the usual train indicative of the disease from which he is suffering, are weakness, loss of weight, thirst and hunger, polyuria, some cough and expectoration, and a few scattered skin lesions upon the extremities. He has no marked dimness of vision, but his eyes become easily fatigued when attempting to use them.

Ocular Examination: R.V. 20/XX—. L.V. 20/XX—. Pupils react to light and accommodation. There is no lack of balance in the external ocular muscles and no loss of accommodation. There is nothing suggestive about the lids or external ocular tunics, and there are no opacities in the lens. The tension is normal, the visual fields unaltered, and there are no scotomata.

Fundus Examination: The general color tone of the eyegrounds as a whole is of a much more decided pink hue than is usual, and there is some lack of pigmentation. The choroidal vessels are

ILLUSTRATING DR. HUNTER MCGUIRE'S CASE OF LIPAEMIA RETINALIS—COLOR SCHEME OF VESSELS WHEN PATIENT WAS FIRST EXAMINED. FAT CONTENT OF BLOOD 8.6 PER CENT



ILLUSTRATING DR. HUNTER MCGUIRE'S CASE OF LIPAEMIA RETINALIS—COLOR SCHEME OF VESSELS TWO MONTHS AFTER FIRST EXAMINATION FAT CONTENT OF BLOOD 3.7 PER CENT

not visible. All the retinal vessels, both main trunks and branches, contain a light salmon colored blood, with the exception of two fine vessels in the superior and inferior nasal quadrants. In these branches, as they extend to the periphery, the blood has assumed a deep cream tint. There are no distinguishing characteristics between arteries and veins, inasmuch as they all contain blood of precisely the same shade. The similarity of this color to the normal hue of the choroidal vessels is very striking. All of the vessels are of normal caliber and rotundity, there is no undue distention or tortuousity, and the central light streak is only faintly visible. Both discs are paler than normal and have a waxy appearance. There are no hemorrhages or exudates in either eyeground.

Blood Examination: The specimen when first withdrawn was very dark and of a purplish hue. Later, in a comparatively short time, there had been an emulsification of the oil globules, and the whole specimen took on a deep cream color with a few streaks of bright red thruout the cream like mass. The blood analysis is as follows: Wassermann negative. Nonprotein nitrogen 23 mg. per 100 c.c. Sugar 540 mg. per 100 c.c. Fat 8,600 mg. per 100 c.c.

Urinalysis: Specimen contains 5% sugar. Specific gravity 1034, trace of albumin, occasional hyalin cast, trace acetone, and no excess of indican. No record kept of quantity passed in 24 hours.

Course: From this period on, fundus examinations were continued at weekly intervals. The vessels were unaltered for a period of two weeks, but at the end of this time it was apparent that they were assuming a more normal color, and in the main trunks it was possible to differentiate the arteries from the veins. The cream color of the finer vessels on the nasal side, however, persisted to some extent tho a pinkish tinge was, apparently, being imparted to the cream. In eight weeks from the date of the first examination, the color tone of all the vessels was practically normal and the central light streak had reappeared. The color scheme remained unaltered until Feb. 10th, and since that time frequent observations have shown that the vessels are still normal.

In order to compare the fat content of the blood at a time when the vessels were normal with the percentage of fat found when the peculiar color existed, a second examination was made on January 17th. On this date the specimen contained 3,700 mg. of fat per 100 c.c. and 650 mg. of sugar per 100 c.c., showing a much lower percentage of fat and a somewhat higher percentage of sugar.

The percentage of sugar in the urine remained fairly constant thruout the whole period during which the observations were made.

With regard to the sugar content of the blood, it should be stated that the examination was not made until 24 hours after the specimen was withdrawn, and inasmuch as certain changes occur in its chemical constitution within four or five hours after the blood leaves the body, notably oxidation of sugar and uric acid, it is probable that the amount of sugar in the patient's blood was higher than the figure given in the report.

COMMENTS.

Lipemia retinalis is described as occurring in chronic alcoholism, phthisis, asphyxia, nephritis, phosphorus poisoning, pneumonia, gout and diabetes. In a careful search of the meager literature, I have been unable to find any case which was not associated with diabetes. Tho all of the recorded cases have been of diabetic origin, it is a noteworthy fact that the usual ocular lesions due to diabetes were not in evidence in a large majority of these patients. In Cohen's case, associated with hypotony, two recent small hemorrhages were observed on one eye, and in the case reported by Reis some lens changes were noted, but other observers have failed to record coexisting ocular lesions.

The extreme variation in the color tone of the vessels in lipemia retinalis, as described by various writers, is

probably due, in a great measure, as Hardy points out, to the amount of fat in the blood and the pigmentation of the fundus. On the other hand, it should be observed that the relationship between the color of the vessels and the percentage of fat is not a constant one. In Hardy's case, for example, the fat estimation was 9.5%, and the impression he gained from the appearance of the vessels is described as a flat toned grayish white, while in my patient the fat estimation was 8.6%, only a point lower than that of Hardy's case, and the predominating color was salmon red, and only in two of the finer vessels near the periphery could the cream color be detected.

In an attempt to explain the milky appearance of the retinal vessels in contradistinction to the normal appearance of the choroidal vessels in lipemia, Cohen has advanced the following hypothesis: "It seems possible that the milky color of the retinal vessels is not due solely to the chemicophysical state of the blood itself, but that in the readily flowing blood the red cells tend to congregate in the middle of the lumen of the vessels, so that the area at the edge of the lumen of the vessels instead of being clear is opaque, because of the lipoid bodies in the plasma. The milky color probably is not seen in the choroidal vessels because the rate of the blood current does not permit an observable separation of the lipoids from the red cells," the accelerated blood current in the choroidal vessels, being due, in his opinion, to the anatomic structure of the choroidal vessels with their wide arborization, anastomosis and extensive venous outflow.

While the majority of observers have recorded that the salmon red tint has been the predominating feature of their cases, others have shown that this peculiar tint is not entirely characteristic of the condition. In Heine's case, for example, all the vessels appeared as if they contained milk and not blood. Hale White describes both arteries and veins as showing a deep cream color, which in the large vessels passes into a pale salmon. Köllner, in whose case the fat estimation was 26%, thus records his observations: "From a dull background the retinal vessels stand out as reddish white streaks. They are much dilated but not sinuous. The tiniest ramifications of the vessels are visible as white threads." In the boy examined by Cohen, forty-eight hours before death, the retinal arteries and veins were similar in all respects, with a slight dilatation of the lumen. The color from the center to the periphery, namely, from the main trunk to the capillaries, was decidedly milky in appearance thruout, and the fat content of the blood was 8.95%.

With regard to the characteristics of the vascular system of the retina in lipemia, other than color changes, some writers have recorded their observations with respect to size, tortuousity and general appearance of the vessels.

In one of R. F. Moore's cases, the vessels were markedly distended and tortuous and were about twice their normal diameter. These characteristics were likewise present in the cases of Heyl and White. In Heine's patient, the artieries as well as the veins were much expanded and gave the impression of bands rather than of cylindric blood vessels, and in Hardy's case, the impression gained was that of looking at flat ribbons twice the width of normal veins. In my case there was no suggestion of either flattening or any marked distention. The vessels were about normal in caliber and had not lost their cylindric contour.

It may be of interest to note that in all but three of the fourteen cases, including my own, now on record, the observations were made in the late stages of diabetes, in most instances not long before the fatal termination. In the cases described by H. White, Hardy and the present one, the fundus picture gradually disappeared and the vessels regained their normal appearance. In the patients of White and Hardy, this may have been due to the systematic measures carried out for the relief of the underlying condition. In my case, as has been stated, no op-

portunity was afforded to institute any treatment.

From the very meager reports we have of case histories, it may be assumed that lipemia retinalis is a rare condition. In my opinion the scarcity of recorded cases may be accounted for partly by the fact that these patients, because of unaltered visual acuity, are seldom advised to seek the assistance of ophthalmologists. I believe, too, as has been pointed out by Cohen, that with the more general and systematic use of the electric ophthalmoscope by the internist, a greater proportion of cases will be discovered in the future than there have been recorded in the past.

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STUDIES IN MONOCULAR AND BINOCULAR ACCOMMODATION WITH THEIR CLINICAL APPLICATIONS.

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The results of testing accommodation in 2,000 additional eyes, making in all 4,200, are here recorded, and also those obtained by testing the binocular accommodation in 500 patients. The bearing of these results on the theory of the mechanism of accommodation and their important practical applications are pointed out. Read before the American Ophthalmological Society, May, 1922.

In June, 1912, the author presented to the Ophthalmological Section of the American Medical Association a report[1] summarizing the work he had carried on for five years, on the amplitude of accommodation at all ages. In the chart accompanying the report, the values of the accommodation found in 2,000 eyes were plotted, and from these values a curve was drawn showing the mean and also the maximum and minimum values found for the accommodation at each year of life.

These results showed certain important modifications of the mean curve obtained by Donders in his pioneer investigations made over a half a century before. That the modifications were in general correct is deduced from the fact that the results obtained were derived from eight times as many cases as Donders used, and the tests, moreover, were made under conditions designed to insure rather greater accuracy. For example, Donders assumed that a middle aged individual who had normal vision and did not accept a convex glass was emmetropic. This assumption, we know, is far from correct—such subjects often having a latent hyperopia of a diopter or more. The failure to recognize this hyperopia would obviously make the estimate of the accommodation in the subject tested just that much too low. In our own series of cases, every subject up to the age of 47 was tested under homatropin, in order to determine the true refraction, and on the basis of this finding the results of the accommodative test were evaluated.

A more important difference between the two sets of observations was the fact, that in our series observations

were multiplied, until it was possible to determine with some degree of certainty not simply the mean but also the maximum and minimum values at each age. This was not possible with the comparatively few observations that Donders gathered.

The importance of determining these values, particularly the minimum at

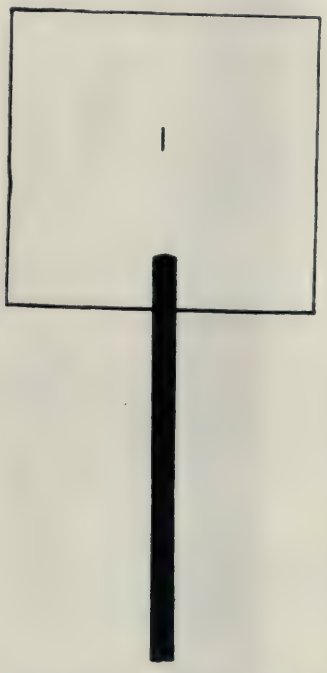

Fig. 1. Accommodation Line. The test for the accommodation consists of a fine vertical line engraved on a card which is held in a suitable clip.

each age, is obvious. In measuring the accommodation in different patients of the same age, we meet with wide variations. Clinically, it is a matter of considerable interest for us to know, first, how wide these variations may be in normal cases; second, what the minimum limit is, below which the accommodation at a given age must be regarded as subnormal. Both these questions are answered by the curves which we have plotted and the tabular values deduced therefrom.

These observations excited but little interest among ophthalmologists. It was felt apparently, as stated by one distinguished critic, that they did not differ essentially from those of Donders, or else, as another man, himself a most able observer, said, that they were mere laboratory experiments and, as such, presumably inapplicable to the conditions of our office work. But both criticisms are invalid. The observations do differ materially and in a very practical sense from those of Donders; and they not only have a very important clinical bearing, but are readily applied in the routine of office work.

Altho in the main these observations have been confirmed by those made continuously since, it has been felt that they needed amplification in two regards. First, the observations at the very beginning and end of the series (below 30 and above 55) were not numerous enough to afford absolutely certain indications as to the maximum and minimum limits. Second, they concerned only monocular accommodation. But, as clinically speaking, binocular accommodation is much more important than monocular, it seemed necessary to determine the former also, and from an equally large number of cases. (See papers 1, 2 and 3.)

Accordingly, the writer has collated the results of five or six thousand observations taken since the original set was compiled, and has added to the latter the values of the monocular accommodation for over two thousand additional eyes. Furthermore, during the last two years, he has made measurements of the binocular accommodation in some five hundred cases, and has determined the relation that this bears to the monocular accommodation in each case. The results are shown in the accompanying charts and tables.

In making the measurements on which these charts and tables are based, the same precautions were taken as in getting the original set[1]. These need not be rehearsed here. I will simply say that in each case the refraction was carefully determined, homatropin being used in all cases of 46 or under, and in some cases above 46; that repeated tests were made whenever possible, the near point being determined by means of the fine

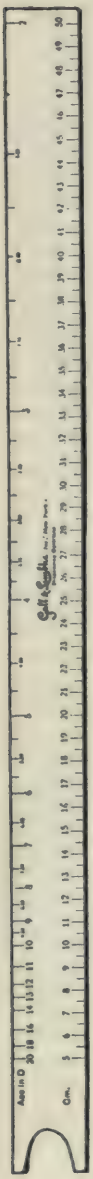

Fig. 2. Accommodation Rule. This is a modified Prince's rule divided into cm. and diopters. The notch at the end is slipped over the nose, so that the zero point of the scale is placed 14 mm. in front of the cornea (practically in the plane of the patient's correcting glass). The accommodation line is carried along either side of the rule to measure the accommodation of either eye separately (the other eye being closed), and along the top of the rule to measure the binocular accommodation (in this case, of course, both eyes being left open). When the line is brought to the point where it just begins to blur or double, the distance of the near point is read off in cm., or the corresponding accommodation is read off in D.

line test object (Fig. 1) and the modified Prince's rule (Fig. 2), either with the full distance correction or with such determinate addition to that correction as would bring the range within measurable limits. In all cases the near point was measured from the anterior focus of the eye (14 mm. in front of the cornea). Every precaution was taken to avoid error and to insure uniformity in methods used. Observations were discarded if repeated observations gave capriciously varying results, or if tests made a year or so later gave higher values.

MONOCULAR ACCOMMODATION.

The values for the accommodation in each eye taken separately, as deduced from the examination of over 4,200 eyes, are shown in Fig. 3, and the maximum, mean, and minimum curves deduced from these values are shown in Fig. 4.

In making these charts, we had to bear in mind that what we are measuring in each case is not the average but the maximum amount of accommodation put forth by each individual. If, for example, a man at various times shows an accommodation of 7.4 D, 7.8 D, and 9 D, and the tests in each case seem equally well authenticated, we say that his range is at least 9 D, the highest of the three measurements, instead of 8.1 D, or their mean. In fact, even the highest accommodation found in a given case may be and often is below the patient's true maximum. Hence a great many of the dots shown in Fig. 3, especially those near the bottom of the mass, should probably be placed a little higher than they are, and hence also the curves drawn in Fig. 4, namely, the minimum curve A skirting the lower margin of the galaxy of dots, the maximum curve C skirting the upper margin, and the mean curve B passing thru the densest portion of the mass, are put as high as they can properly be placed.

The values obtained for each age are given in the following table:

I. TABLE OF ACCOMMODATION AT VARIOUS AGES.

In D and tenths. Near point reckoned from anterior focus of eye (14 mm. in front of cornea).

Age	ACCOMMODATION		
	Minimum	Mean	Max.
8	11.6	13.8	16.1
9	11.4	13.6	15.9
10	11.1	13.4	15.7
11	10.9	13.2	15.5
12	10.7	12.9	15.2
13	10.5	12.7	15
14	10.3	12.5	14.8
15	10.1	12.3	14.5
16	9.8	12	14.3
17	9.6	11.8	14.1
18	9.4	11.6	13.9
19	9.2	11.4	13.6
20	8.9	11.1	13.4
21	8.7	10.9	13.1
22	8.5	10.7	12.9
23	8.3	10.5	12.6
24	8	10.2	12.4
25	7.8	9.9	12.2
26	7.5	9.7	11.9
27	7.2	9.5	11.6
28	7	9.2	11.3
29	6.8	9	11
30	6.5	8.7	10.8
31	6.2	8.4	10.5
32	6	8.1	10.2
33	5.8	7.9	9.8
34	5.5	7.6	9.5
35	5.2	7.3	9.3
36	4.9	7	9
37	4.5	6.7	8.8
38	4.1	6.4	8.5
39	3.7	6.1	8.2
40	3.4	5.8	7.9
41	3	5.4	7.5
42	2.7	5	7.1
43	2.3	4.5	6.7
44	2.1	4	6.3
45	1.9	3.6	5.9
46	1.7	3.1	5.5
47	1.4	2.7	5
48	1.2	2.3	4.5
49	1.1	2.1	4
50	1	1.9	3.2
51	0.9	1.7	2.6
52	0.9	1.6	2.2
53	0.9	1.5	2.1
54	0.8	1.4	2
55	0.8	1.3	1.9
56	0.8	1.3	1.8
57	0.8	1.3	1.8
58	0.7	1.3	1.8
59	0.7	1.2	1.7
60	0.7	1.2	1.7
61	0.6	1.2	1.7
62	0.6	1.2	1.6
63	0.6	1.1	1.6
64 to 72	0.6	1.1 to 1	1.6

BINOCULAR ACCOMMODATION.

The above are the limits for each eye tested separately. For binocular accommodation the values here given for the minimum and mean limits should be increased by 0.6D for ages 10 to 17; 0.5D for ages 18 to 31; 0.4D for ages 32 to 53; and 0.2–0.3D for ages above 53.

This table differs slightly from that determined ten years ago and reprinted since in a number of publications. In particular, the values given, especially at the earlier ages, are somewhat lower. The differences, however, are not material and, in a sense, they are more apparent than real. It must always be remembered that the upper and lower limits determined from a plot of observations of this sort must be more or less indefinite. For the reason already given, this is particularly the case with the lower limit. Thus it is difficult to tell in the case of the lowest dots in Fig. 3 which are to be counted as low normal and which are actually subnormal. Most of them doubtless are to be counted as subnormal, but in order to be on the safe side and to exclude no normal cases, the minimum curve, A, has been set rather low. Thus we are able positively to assert that an accommodation which persistently falls below the minimum value in Table I is certainly subnormal. Quite likely it is subnormal even when somewhat above this limit—at all events, it must be regarded with suspicion.

TABLE II.

Comparison of Monocular and Binocular Accommodation at Different Ages.

Age.	Excess of Binocular over Monocular Accommodation.	
	Extreme excess in D.	Usual excess in D.
8-15	0 to 6	1 to 2
16-34	0 to 3 or 4	0.5 to 1.5 (1D quite common)
35-38	0 to 2.5	0 to 1.5 (usually not over 1)
39-44	0 to 2	Usually not over 1
45-50	0 to 1.4 (in one instance 1.75)	Usually below 1; often below 0.8
51 and higher	0 to 0.9	Usually below 0.5

NOTE—The extreme differences noted above are in some cases to be regarded with suspicion, it being likely that the subject's observation was faulty or that he failed in the monocular test to put forth his full effort. In one or two instances, however, there is no question that a considerable difference, i. e., one of several D., existed.

BINOCULAR ACCOMMODATION.

In testing the binocular accommodation, the same routine was used and the same precautions were adopted as in testing the monocular. In each case the subject was provided with his full correction, or with a known addition thereto. Then the accommodation was taken with the accommodation line and the Prince's rule, first for the right eye, then for the left, and lastly for both together. At the same time the width of the pupils was measured, both when the eyes were converging to 25 cm. and to 10 cm. This was done in order to ascertain whether there was any truth in the contention that any excess found in binocular over monocular accommodation is attributable not to real increase in accommodative action, but to a sharpening of vision due to the stenopaic action of pupils contracted by the convergence effort. Lastly the distance of the convergence near point was noted, and the presence of any motor anomaly, particularly the presence of any great amount of exophoria in convergence, or any condi-

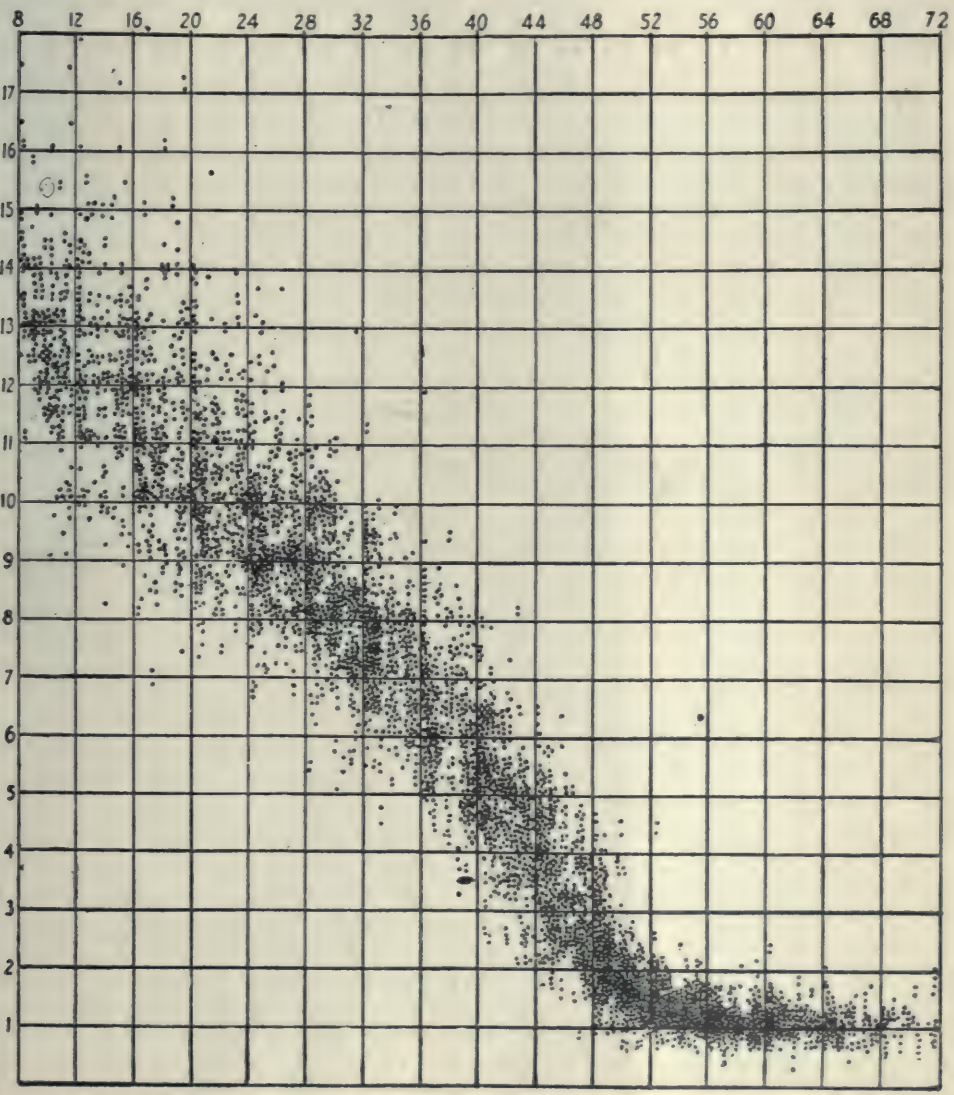

Fig. 3. Values of Monocular Accommodation. Each dot represents the maximum value in D. of the accommodation in a given eye. The results obtained in over 4,200 eyes are here plotted.

tion interfering with binocular fixation or binocular vision at near points.

The values thus obtained for the binocular accommodation, plotted on the same scale as that used for the monocular accommodation, are shown in Fig. 5.

The number of cases examined is yet too few to establish with certainty the mean, maximum, and minimum limits of binocular accommodation, yet the following may be stated as fairly certain conclusions:

1. The binocular accommodation is regularly higher than the monocular. (Compare Fig. 6, in which the monocular accommodation of the cases shown in Fig. 5 are exhibited.) In individual cases the difference may at times be considerable. (See Table II.)

2. The excess, altho varying greatly in different cases and even in the same case at different times, is quite constantly present. There are but few cases in which the binocular accommodation is not notably superior to the monocular; and even when the two seem to be equal, as shown by one measurement, a repetition of the test

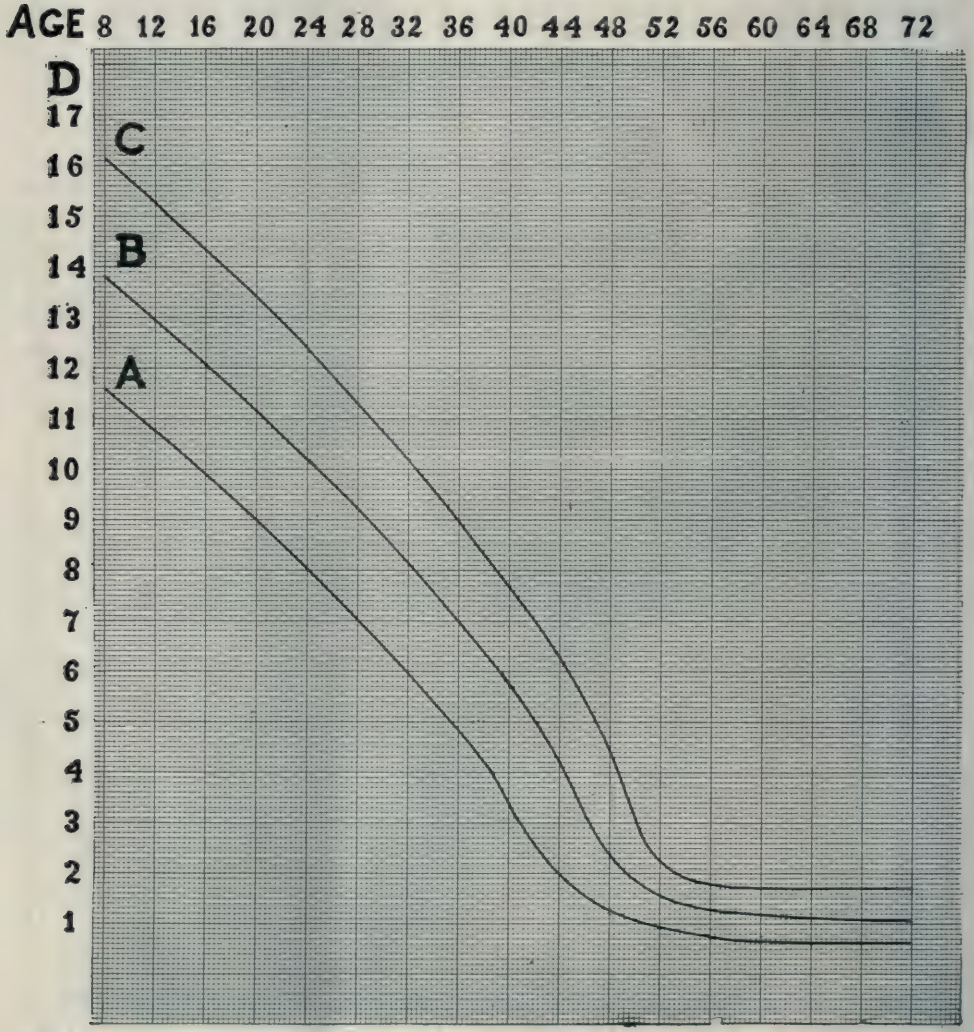

Fig. 4. Accommodation Curves. These are deduced from Fig. 3. A represents the extreme minimum, and C the maximum limits of those dots in the whole mass shown in Fig. 3, which can be regarded as representing normal values. B is the curve representing the mean value of the accommodation.

usually shows that the binocular accommodation is the higher.

3. Only in the rarest instances was the binocular accommodation found lower than the monocular, and even these few cases are open to suspicion, since the values then found were generally deduced from but a single observation, and the conditions were such as not to insure accuracy.

4. While the individual differences between the monocular and the binocular accommodation may run up to 1.5 D or more, the average difference deduced from the entire mass of observations is a comparatively moderate one. Thus the values tentatively derived for the mean value and the minimum limit of the binocular accommodation are, for ages between 10 and 17, about 0.6 D—0.7 D higher than for monocular vision; while from 18 to 31, the difference amounts to 0.5 D; from 32 to 53 to 0.4 D, and for higher ages, to 0.3 D.

5. The excess of the binocular over the monocular accommodation is not in ordinary cases attributable to the clearer vision produced by the contraction of the pupil that the convergence induces. This is abundantly proved by our pupillary measurements, particularly in the older subjects. In these the extra contraction of the

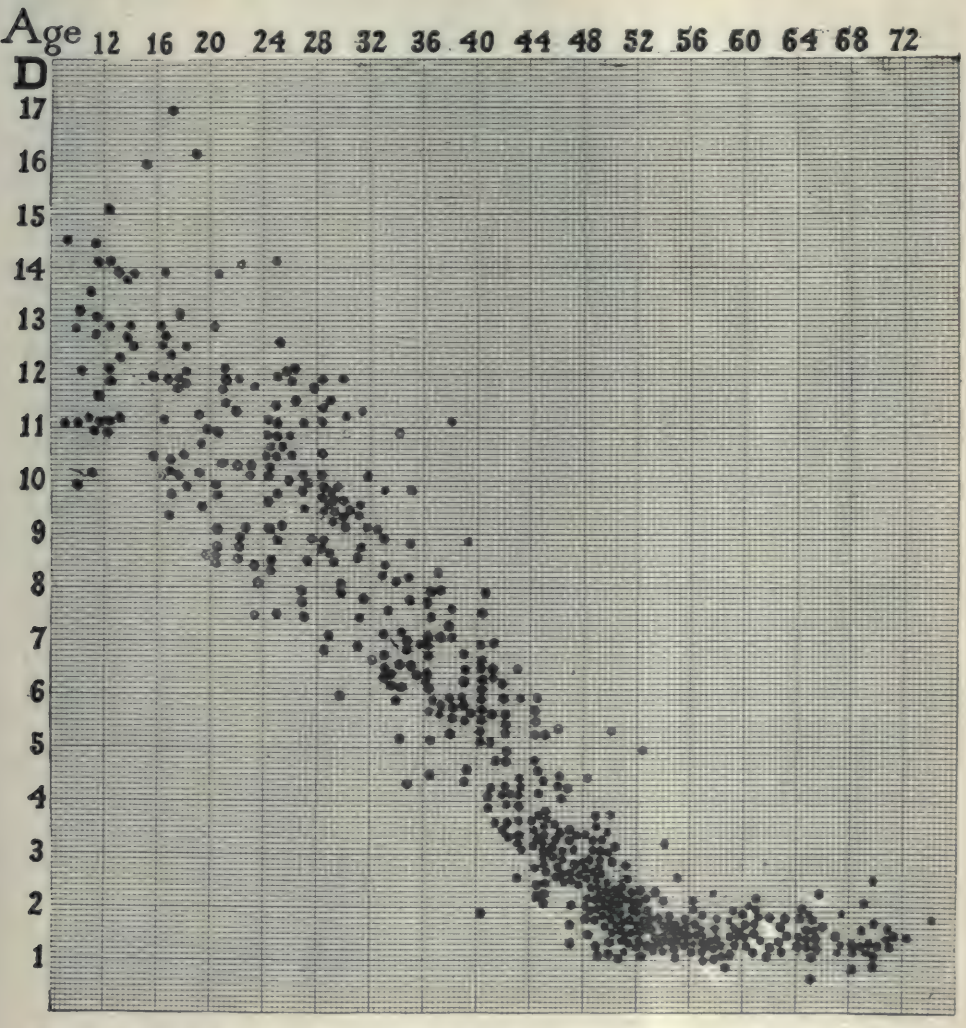

Fig. 5. Values of Binocular Accommodation. These are plotted in the same way as the monocular values in Fig. 3.

pupil set up by converging to the binocular (as distinguished from the monocular) near point, is quite negligible. In very young subjects, with very high accommodation and extremely mobile pupils, this element may be a factor, and may account for the considerable discrepancy sometimes found between the monocular and binocular values.

6. On the other hand, there seems every reason to think that, in the main, the accommodative surplus in binocular vision is due directly to the convergence action itself, which being strongly stimulated sets up an extra accommodative effort, impossible for one who is not converging. In other words, it is a true heightening of the accommodation, not a pseudoaccommodation as would be the case if it were due to the pupillary contraction. The difference, in fact, between monocular and binocular accommodation means that in monocular vision there is a certain degree of inertia of the accaccommodation, which is overcome by the extra effort set up when the two eyes converge. This inertia must be seated in the ciliary muscle, i. e. is an inertia

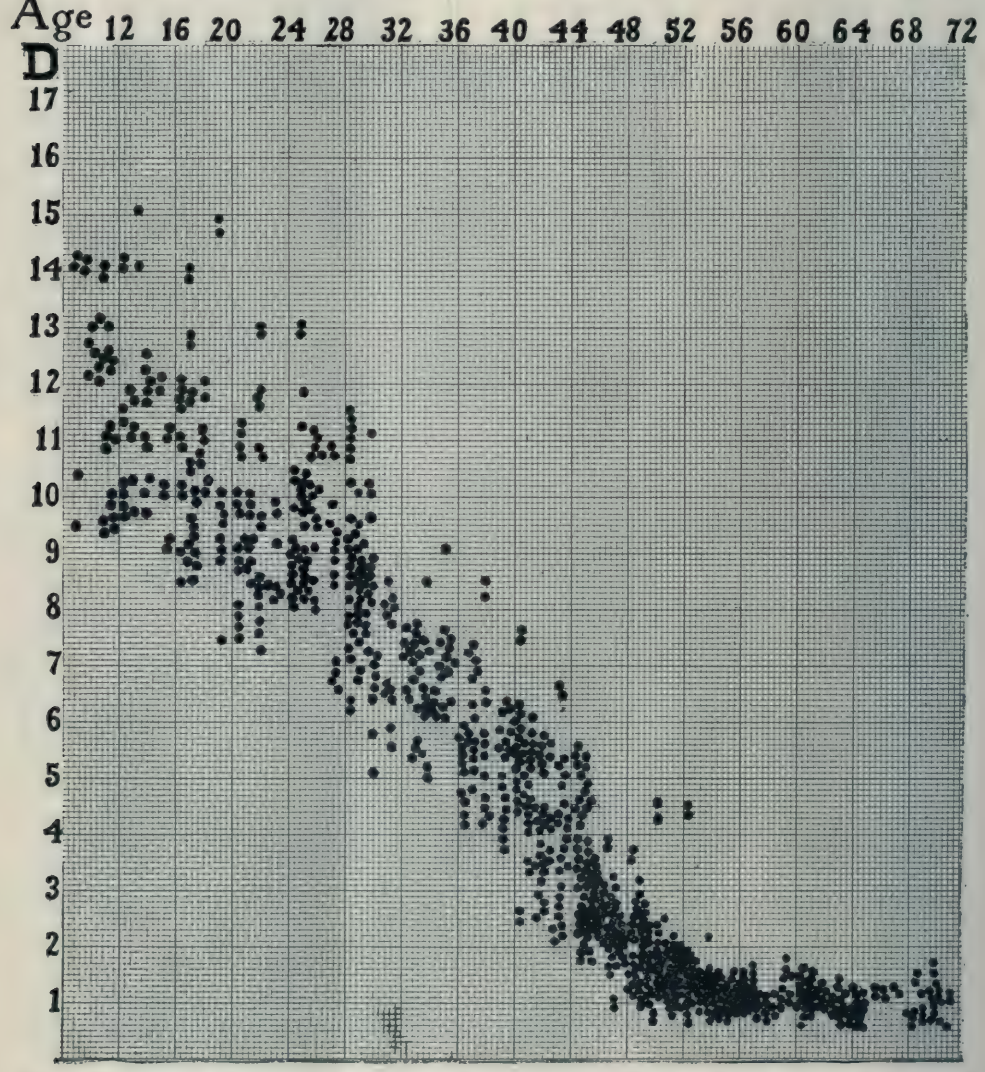

Fig. 6. Comparison of Monocular and Binocular Accommodation. The spots here represent the values of the monocular accommodation in the subjects in whom the binocular values shown in Fig. 5 were determined. It will be observed how the general sweep of the galaxy of dots in 5 rises above that in 6.

of what Fuchs calls the physiologic accommodation.

7. To a certain extent the enhanced accommodation in binocular vision may be due to the added clearness and, we may say, added realness of the binocular as opposed to the monocular image. But this surely is a subsidiary factor. That the enhancement due to the binocular act may be present without it, is proved by the fact, repeatedly observed, that the binocular enhancement exists either when one eye is amblyopic, so that the images cannot reinforce each other, or when there is divergent squint, so that there is no superposition of images at all, and yet still a strong attempt at convergence is made.

8. In any case, the added range and clearness effected by binocular vision constitute a very real advantage, especially in presbyopia. A man who is deprived of the use of one of his eyes is quite aware that his range of near vision is considerably less, and the sight itself is less satisfactory than if he had two. We must reckon with this fact in giving him a reading glass which must, as a rule, be at least 0.5 D stronger than if he were two eyed.

9. Above the age of 55, there is a true accommodation varying from 0.5 D or less to 1.5 D, and averaging about 1 D. The contention is made by some that the accommodation shown at this age is spurious, being due to the small size of the pupil, which so diminishes the size of the diffusion images, that the eye can see distinctly at near points without accommodating at all. This contention is negatived by our observations, which show that often in these elderly subjects the pupils are 3 mm. or more even when converging to their reading point. Nor is the size of the pupil essentially different when the eyes are adjusted for distance and when they are focused for 25 cm., which is about the nearest point to which they are usually adjusted by glasses. We may say, then, that ordinarily distinctness of near vision is not secured in these older subjects by a contraction of the pupil.

In very young subjects, as we have already seen, a contraction of the pupil may possibly produce a pseudoaccommodation, but our observations lead us to suppose that this occurs but rarely.

THEORY OF THE MECHANISM OF ACCOMMODATION.

Accommodation is effected by a passive expansion of the elastic lens, that takes place when the pressure exerted by the suspensory ligament upon the lens is relaxed. This passive expansion is aptly termed by Fuchs the physical accommodation, and the near point to which the eye can be actually focused by the elastic expansion of the lens is called the physical near point. Owing to the sclerosis which takes place in the lens progressively from youth on, the physical accommodation steadily diminishes and the physical near point steadily recedes with age.

Contrasted with this purely passive expansion, which decreases from year to year, is the active contraction of the ciliary muscle by which the relaxation of the zonula and hence the passive expansion itself are effected. This active contraction constitutes the physiologic accommodation (Fuchs), and the near point to which the eye could be adjusted if this active contraction were pushed to its limit and the lens also were perfectly fluid, is the physiologic near point.

Now while the physical accommodation diminishes steadily from youth up, it is generally held that the physiologic accommodation does not diminish at all until advanced life. There seems, indeed, no reason why the ciliary muscle, which is kept in continual practice all thru life, should contract any less vigorously at the age of 45 than it does at the age of 10. In fact, persons of both ages should have a physiologic accommodation of maximum amount, equivalent to a physical accommodation of not less than 20 D.

Now this inference, which is fully accepted by Hess and other exponents of the Helmholtz theory, involves certain corollaries which are not borne out by clinical evidence.

For example, suppose that a man of 45 has a maximum physical accommodation of 4 D, i. e., this represents all that he can possibly do in the way of relaxing his lens. This relaxation involves a very moderate amount of ef-

fort on the part of the ciliary muscle—in fact only a fifth of the whole 20 D that the full activity of the latter is supposed to represent. It would seem perfectly easy for him to put forth this minimum amount of his total ciliary activity and under all conditions get 4 D of manifest accommodation. Now, as a matter of fact, this is not the case. Tested with either eye singly, such a person rarely exerts more than 3.5 D. and often not over 3 D of accommodation. When in this case he shows only 3 D of physical accommodation, it is evident that this also represents the total ciliary effort (physical accommodation) that he is making at the time; for if he made any greater effort his physical accommodation would rise above 3 D, since the lens itself can relax up to 4 D if the ciliary muscle contracts correspondingly. Instead, then, of uniformly showing 4 D of accommodation under all conditions, he does so only under the extra stimulus afforded by binocular vision and convergence, and even then attains the maximum only part of the time.

The above statement holds good even up to the age (60 or over) when the accommodation is reduced to a minimum. Thus a person of 60 who has a monocular accommodation of only 1 D, will quite regularly have a binocular accommodation of 1.3 to 1.4 D. The extra amount of ciliary contraction required according to the ordinary theory, to produce the sight additional relaxation which would be neeeded to effect the differences between 1 D and 1.3 D of lenticular refraction is so small, that one does not see how anybody could fail to make it if he had a really large ciliary power to draw on. Yet evidently nearly everyone does fail to make it, unless some extra stimulus like that imposed by binocular vision and the convergence of the eyes impels them to a maximum effort.

It seems inconceivable that one who really had a contractile force equivalent to 15 to 20 D should be unable to put forth under all conditions, when called on, the comparatively small fraction required to produce a change of 2 to 4 D in the refractive state. Far more likely does it seem that from some cause—perhaps from physiologic inhibition — the ciliary energy itself actually diminishes with the years, i. e., that the physical and the physiologic accommodation diminish together, altho not necessarily at the same rate.

What lends additional plausibility to this view is the behavior of the eyes under homatropin. According to the usual views as enunciated by Hess and others, a boy of 15, a young man of 25, and a man of 40 would each have a physiologic accommodation (c i l i a r y contraction) of equal amount, say one equivalent to a physical accommodation of 20 D. The actual physical accommodation, produced by the relaxation of the lens, would on the contrary be very different. In the first case it might be 16 D, in the second 10 D, in the third 5 D. In the first case there would thus be 4 D, in the second 10 D, in the third 15 D of latent ciliary energy, i. e., of energy which is never expended in changing the shape of the lens, and the abolition of which, therefore, would produce no effect on the physical accommodation. If now we instill a gradually acting poison like homatropin into the eyes of all these subjects, it should begin to show an effect only after the latent energy in each case had been abolished by the paralysis. In the case of the boy, as only 4 D are latent, the effect should be manifest very soon—in about ten minutes—after the instillation. In the second case the effect should not be manifest until quite a little later, and in the third case it should be manifest only after the lapse of 30 or 40 minutes, if at all. Now as a matter of fact, in a great many instances at least, the cycloplegia begins to show itself almost if not quite as soon in the middle aged man as it does in the boy. In fact, in persons of 46 or 48, the cycloplegia due to homatropin may become manifest in from 10 to 15 minutes after the instillation, and then proceed at a rate quite like that of the youth. These facts are supported by a large number of observations in which care was taken to exclude disturbing factors, such as the blurring due to the mydriasis, etc. It does seem, therefore, that the hypothesis that the ciliary power in the young and middle aged is equal is untenable.

THE ACCOMMODATION IN MALES AND FEMALES.

Examination of the great mass of statistics shows that, in general, the accommodation is equal in the two sexes, and that the march of presbyopia is the same in each. This is graphically shown in Fig. 5.

POSTCYCLOPLEGIC EFFECTS OF HOMATROPIN.

Ordinarily the effect of homatropin, if applied in a thorogoing way, may be said to wear off in 48 hours. But a moderate effect noticeable by careful tests often persists for several days later. For this reason it is best to defer a postcycloplegic test till five or six days, at least, after the instillation.

There is, however, a more lasting effect produced by the instillation, especially in eyes with latent hyperopia. We have repeatedly noted that tests made even some weeks after the homatropin, and after the application of the correcting glasses, show an accommodation distinctly below that present before the use of cycloplegic. It would seem as if the eye, having once learned to give up a compensating accommodative effort, could not for a time thereafter put forth even the normal accommodative power. Whether this postcycloplegic accommodative insufficiency, which usually is never of any great amount, produces any symptoms or not I do not know.

CLINICAL APPLICATIONS.

The observations recorded have an important clinical bearing[2,3]. Since they establish the norms of accommodation, they afford a means of judging when and how such a given accommodation varies from the normal.

Subnormal Accommodation; Hypocyclosis.—Since the days of Donders, the rôle of accommodative strain in causing the asthenopia of hyperopes and astigmatics has been a commonplace. It is all the more remarkable that, on the whole, so little attention has been paid to the part played by subnormal accommodation in causing eye troubles. Rarely, in fact, is the accommodation tested except in a perfunctory way, and, previous to this series of investigations, there has been little if any attempt to fix the maximum and minimum limits of accommodation at each age. Yet until these latter are known, we cannot, except in extreme instances, say definitely whether a given accommodation is normal or not.

It can now be positively stated that a monocular accommodation which is persistently below the minimum limit indicated in Table 1 is certainly subnormal, and that it is probably subnormal if it never rises much above this limit. Furthermore, the binocular accommodation should in young persons be at least 0.5—0.6 D, and in older subjects 0.3—0.4 D higher than this minimum.

It does not fall within the scope of this paper to consider at length the varieties, symptoms, and treatment of subnormal accommodation. It will suffice to say, that it is a frequent condition and that there are two kinds. In one, which may be called lenticular hypocyclosis, the ciliary muscle apparently acts in normal fashion, but the crystalline lens is more rigid than usual. In other words, there is a condition of premature presbyopia. In such a case, there are few if any symptoms of eyestrain, but as years go on the accommodation remains persistently lower than normal, and presbyopia sets in much earlier than usual.

In the second kind of subnormal accommodation, the lens has the usual rigidity, but the ciliary muscle is underactive. Except in cases due to structural disease of the central nervous system, the accommodation in this variety shows wide variations from time to time, and when it is low there is often marked asthenopia. This form of low accommodation is often associated with convergence insufficiency, and the symptoms often attributed to the motor anomaly are without doubt in many cases due to accommodative disturbance, or at least are aggravated by it.

Ciliary hypocyclosis can often be relieved and the symptoms greatly helped by convergence training and by direct training of the accommodation. For the latter purpose, exercise several times a day in focusing on the accommodation line, first with one eye, then with the other, and lastly with both, is useful.

Unequal Accommodation; Anisocyclosis.—Not infrequently the accommodation is found to be unequal in the two eyes. Usually this inequality seems to be due to unequal rigidity of the crystalline lenses. It rarely causes any disturbance, but has to be reckoned with in correcting presbyopes; for if they show an unequal accommodation, it is sometimes helpful to give them also an unequal addition to the correction for distance. The fact that the accommodation may be thus unequal in the two eyes is sufficient reason for our habitually testing it in each eye separately as well as in both together.

Accommodation Measurements in Testing the Depth of Homatropin Cycloplegia.—This is an application of the accommodation tests which I regard as of great importance. The ordinary practice of making the refractive examination at a fixed time—an hour, it may be—after the first instillation of the homatropin, leaves out of consideration the fact that the march of homatropin cycloplegia varies greatly in different persons. In some few it seems complete in less than an hour; in others it is not complete for some two hours. Moreover, there seems reason to think that the acme of the effect is soon passed; at least if the test is not done until long after the instillation, the results may be uncertain.

The most satisfactory method is to make tests of the residual range at intervals, beginning an hour after the first instillation, and to defer the examination of the refraction until the range has been reduced below 1 D, then make it at once. Furthermore, when the refraction has been determined, the far point with a +3 D. added to the full correction should be at 33 cm. and the near point at something over 25 cm. and preferably not less than 28 cm. (representing in the latter case a range of 0.6 D). When the range is much wider than this, our results must be regarded as somewhat uncertain.

ACCOMMODATION TESTS IN OFFICE PRACTICE

The tests used require only the simplest of apparatus and can be made very quickly. They are hence adapted to the exigencies of office practice, of which, considering their importance, they should form a part in the regular routine of the examination of each case. In applying them the following precautions should be used:

1. The patient is placed in a good light and provided with his full correction, and (in presbyopic cases) with such addition thereto as will bring his near point within measurable limits. In this case, of course, the accommodation read off on the scale must be diminished by the strength of this added glass.

2. In very young subjects with high accommodation (12 D or more), it is often well to add a —3 or —4 D to the distance correction, in order to carry the near point out to a place on the rule where, the graduations being further apart, there will be less likelihood of error in the measurement. Of course, in this case the accommodation as read off on the scale must be increased by the strength of this added glass.

3. The zero point of the Prince's rule is placed 14 mm. in front of the cornea (practically in the plane of the patient's correcting glass).

4. The left eye is covered and the accommodation card carried in along the rule until the line seen with the right eye blurs or doubles. The corresponding value of the accommodation is then read off in D. Then the right eye is covered, and a similar test made with the left, and lastly the accommodation is measured with both eyes open, the patient at the same time being urged to converge on the test-object.

5. It is well to make sure that the patient understands exactly what we desire him to observe, and to make several observations in succession in order that we may get his maximum effort.

SUMMARY.

1. The examination of the accommodation in 4,200 eyes enables us to state with precision the maximum and minimum limits, as well as the mean values of the monocular accommodation at all ages. The results obtained are shown in the curves and tabular values here presented.

2. These observations substantially confirm those made ten years ago. The mean and lower limits have been set somewhat lower, so as to be sure not to exclude any low normal cases. Any case whose accommodation is persistently below the minimum limit is certainly subnormal, and any case in which the accommodation remains only slightly above the minimum limit is probably so.

3. The binocular accommodation is regularly higher than the monocular, the excess being regularly equal to 0.6 D or more below the age of 17; 0.5 D from 18 to 31; 0.4 D from 32 to 53; and 0.3 D for ages over 53. In individual cases the difference may be much greater.

This difference is a very real advantage especially in presbyopes. Binocular accommodation is not only higher but better as regards ease and clearness. This fact must be borne in mind especially in prescribing reading glasses, and in cases of monocular vision (monocular cataract, etc.), we must prescribe a glass 0.5 D or so stronger than we would for a two eyed patient.

5. The excess of binocular accommodation apparently represents an actual increase of ciliary effort, imposed doubtless by the act of convergence. It cannot be attributed to the added clearness secured by a contraction of the pupils, since it is quite uniformly observed even when no such contraction exists.

6. As little can the contraction of the pupil be called in to account for the accommodation of 1 D or more, quite regularly observed in patients over 55. The accommodation in this case, in all probability, represents the same process as in youth, i. e., relaxation of the lens produced by contraction of the ciliary muscle.

7. These observations and others adduced should lead us to modify somewhat our conceptions of the accommodative process. Particularly these should lead us to think, contrary to the prevalent view, that not only the elasticity of the lens (physical accommodation) but the activity of the ciliary muscle (physiologic accommodation) diminishes with age, and that in advanced life only a comparatively small amount of ciliary energy can be put into play.

8. The accommodation is equal, and presbyopia advances at the same rate in the two sexes.

9. The relaxation of effort produced by homatropin and by the prescription of correcting glasses seems in many cases to set up a condition of moderate accommodative insufficiency, lasting, it may be, for a number of weeks.

10. The practical applications of these observations are of considerable importance. In particular, the observations determine whether a given accommodation is subnormal or suspiciously low, and enable us to tell when we have succeeded in raising it to near the normal limit. Subnormal accommodation is frequent and comprises two kinds, lenticular and ciliary. The former, which may be called a premature presbyopia, is a stable condition, causing apparently little or no reflex symptoms; the latter is a variable condition, often causing marked asthenopia and requiring active treatment. The other practical applications consist, first, in the recognition of the fact that the accommodation may be unequal in the two eyes, so that in presbyopia an unequal reading addition may be required; and, second, in the employment of the accommodation tests in determining the depth and reliability of homatropin cycloplegia.

11. In order to make the tests available for practical application, they should be performed in a uniform way and with certain precautions. When so performed they give reliable results. They are readily and briefly made with simple apparatus, and hence are easily adapted to the conditions of ordinary office work.

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A FEW OF THE MANY RESULTS OF A SLOW, PAINLESS CYCLITIS.

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A case is reported in which slow, painless cyclitis preceded cataract operation. In the second eye, the lens on removal resembled a cyst with a thick leathery capsule. In a second case, iridocyclitis developed six days after cataract extraction. Preliminary iridectomy is advised for such cases.

A woman, Mrs. G., now aged 75 years, consulted me several years ago with respect to a dimness of sight of the left eye. I found on examination a cloudiness of the nucleus of the lens —a good a.c., p. a little larger than usual in elderly people, which tho active, did not contract fully. O. D. normal—T. full.

Viewing this condition, as the outcome of the presence of a slow, painless cyclitis, I did an iridectomy. R. eye had good vision, and was apparently unaffected, tho the pupil had a suspicious look.

The ciliary processes in cases of senile cataract are seldom normal, and very often indeed vary from the healthy standard much more than is suspected: for unfortunately there are not, at present, any means of estimating their exact state, and hence the ever dreaded cycloiritic complications following cataract extraction. The left lens got more opaque, and at the end of three years was mature. At this time the right eye began to show the same condition as the left, when it was first seen by me. I now performed an iridectomy. A few days later, I did a cataract extraction on the left eye. When I introduced the pricker and had gently touched the lens, it was dislocated downwards. I now used the wire scoop and removed the lens in its capsule, without loss of vitreous. This was a hard opaque lens with a firm capsule.

If the extraction of a cataract similar to this, using a scoop, be accomplished without loss of vitreous, this latter is often due to the effects of a slow, painless cyclitis and not to any unusual skill of the operator. Tho the eye healed kindly with media clear, R. normal Tn., still the vision was only 6/9. I think that the vitreous remained intact owing to the change in its structure, that is, becoming firmer due to the cyclitis. Hence it bore the pressure of the scoop without giving away, and also accounts for the imperfect vision. The lens, being also weakened in its attachments from the same cause, became loosened on very slight pressure.

The lens of the right eye, becoming gradually more opaque, was in two years mature. A little later I operated and had a different experience, but one which more pointedly showed the presence of cyclitis as a cause. When I introduced the pricker, there was a very slight dislocation of the lens, and being on the alert, I at once withdrew the instrument. The dislocation being very slight, I applied pressure with the spatula and quite easily delivered the lens in its capsule without loss of vitreous. The lens, however, instead of coming out with the usual rigid shape, was merely an elongated mass. On examination, I found that it resembled a large cyst, the capsule being thick and leathery, and the contents fluid, and floating in the center was a small dark colored nucleus.

The eye did well. These cases, one may say, so uniformly do well, the nonpresence of soft lens substance and lacerated capsule being the great factors. Thus there are completely removed the two most fruitful sources of irritation of the ciliary region. However, when these two sources are not removed, then we can and do have,—thru their irritation of the ciliary processes, which latter in these cases are always unhealthy in varying degrees, and thus easily aroused—all varieties of inflammation from the slightest iritic adhesion or a slight thickening of the capsule to a cycloiritis, even purulent in character.

This is to me the explanation of the socalled endogenous infection. Very seldom indeed, is there that complete absence of all signs of inflammation, noticed when the lens is removed in its capsule. In the complete removal of lens and capsule lies the chief claim that Colonel Smith's operation has to the superiority, which it does possess in regard to the other operations, practiced for the removal of the mature senile cataract.

Of the left eye, after the operation, V. with glasses was 6/9. Two years later the vision was 6/12, media being clear and Tn. The right eye one year after the extraction, V. = 6/9, media clear, Tn. The condition of the right lens could assuredly be ascribed to the cyclitis.

When in the usual cataract extraction, a lens comes away easily, and everything goes smoothly and the parts are well in situ, it is known to us all that the eye sometimes does not heal kindly, owing to a slow, almost painless cycloiritis, the socalled glaucomatous condition being one of the sequels. The unhealthy ciliary region causes a weakness of the structures, and hence the lens readily glides out of the lacerated capsule on pressure, and the eye also readily succumbs to an inflammation.

When the scoop is used in a case of dislocation of the lens and vitreous is lost, it is that the structures supporting the vitreous chamber are weakened from the painless cyclitis and easily give away on pressure. If the vitreous be healthy, a good result will follow: but if fluid, then a slow cycloiritis sets in and the eye is sooner or later practically lost.

The fluid vitreous shows that the cyclitis has also implicated the vitreous chamber. Of course, under ordinary circumstances, when healthly vitreous is lost, it is very much more often due to a sudden squeezing of the eyelids of the patient, or the want of deftness on the part of the operator than to a cyclitis. When, however, the vitreous is fluid, then the loss is much less frequently due to the patient or the operator, than to the cyclitis. Thus it is, that in one case the cyclitis causes an increased firmness of the vitreous and in another a fluidity. In the lens, apparently, there may be the same diversity of effect, but in the same patient, in that the lens of one eye is in a decidedly hard, and the other a decidedly fluid state. In this right eye, however, the changes produced strikingly exemplify the very marked degenerative condition, that the slow, painless cyclitis is capable of producing.

I have not yet resorted to any continuous internal medical treatment on account of certain attending difficulties: but if any further deterioration of the vision of either eye takes place, I shall promptly enforce its use.

My second case, a man, Mr. J——, aged 78 years, had his mature senile cataract removed by me. I performed the usual cataract extraction quite satisfactorily. At the end of the fifth day, the eye was doing well, the pupil being dilated and only a little lens substance and lacerated capsule in the pupillary area. On the sixth day, suddenly and unexpectedly, severe iridocyclitis was developed. Seeing that the eye would be lost unless energetic means were used, I resorted to the use of the "Combined Treatment" with speedy relief and finally a good result. This case was thus one of those with unhealthy ciliary processes, where there had been no previous suspicion of such a condition. If I had been able to diagnose the true state of these processes, and had practiced the same treatment prior to the operation that I did afterwards, in all likelihood the attack would not have occurred.

Again, in the second case had I performed Smith's operation, instead of the one I did, and thereby have completely removed the two sources of irritation, namely soft lens substance and lacerated capsule, I feel that I would have had a good result without any inflammatory complications.

And vice versa in the first case, if I had not completely freed the eye of lens substance and capsule, I would undoubtedly have had severe iridocyclitis.

These two cases, it seems to me, emphatically impress upon the mind of

an oculist two things: one that Smith's operation, or one that completely removes lens and capsule, is preferable to the operation that does not: and the other that it is necessary sharply to scrutinize the eye before operating as to the condition of the ciliary processes, and to be able to estimate their departure from the normal standard. If this be done, then if confident that disease is present, there are two ways to act,—one to do Smith's or a similar operation—and the other, if the usual operation be preferred, to prepare the eye by previous treatment with Hyd. and iodid, or still more effectually by the use of the "Combined Treatment."

These conclusions seem to me to be rational and to enable reliable preventative measures to be used. It is especially so, when nonsuccess has already occurred in one eye, and the operator does not wish to practice Smith's or a similar operation, but again to perform the same one in the remaining eye.

An additional preventative measure would be to do a preliminary iridectomy, tho it is so scathingly denounced by some oculists, but I beg to say, unjustifiably: for those cases in which a preliminary iridectomy has been followed by an inflammation, have been so affected on account of the inherently diseased condition of the ciliary processes, and not on account of any increased liability arising out of the preliminary operation, as this latter has a contrary, deterrent effect.

THE IMPORTANCE OF HETEROPHORIA TESTS IN ROUTINE REFRACTION.

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The mutual relations of heterophoria with errors of accommodation are discussed. A distinction is made between accommodative convergence and fusional convergence. The significance of various forms and manifestations of heterophoria are considered. Presented in the Section on Ophthalmology of the American Medical Association, at the St. Louis Meeting, May, 1922.

Homer failed to state why "Odysseus bored out the eye of Polyphemus," but we can safely infer that it was not a surgical measure for the relief of asthenopia, for with but one eye the Cyclops must have been free from the exacting demands of coordination necessary to binocular single vision. Rather, he was fortunate in the possession of a monocular system requiring only an incoordinated fixation and accommodation, and incidentally the ordeal of a single instead of a double operation. It is only in man in the highest, and in a few of the anthropoids in a lesser degree, that the most extraordinary function of binocular single vision has, in the process of evolution, been attained. It is, moreover, chronologically considered, one of the more recently acquired coordinating functions and, therefore, less stable than, more easily influenced by, and subservient to, the older fundamental functions. Heterophoria is, therefore, essentially a problem of evolution in physiology. Among the lower vertebrates, in the hare, for example, the orbits are on opposite sides of the head, and the visual axes directed so nearly opposite that the two visual fields probably nowhere overlap. Further up, in the dog, much of the two fields is in common, and fair binocular vision is probable. Yet there is no evidence of a perfected binocular vision. In monkeys, the visual axes may approach parallelism and some may have acquired slight convergence, and most probably a moderate degree of binocular single vision. In man, it is a function of such mechanical precision as is nowhere else exhibited in our physiology, and subject to an error of less than a fourth of a minute of an arc.

The subject of heterophoria is most difficult because the function of muscle balance involves the coordinating action of two or more of the twelve extrinsic muscles, acting as a duet, quar-

tet or sextet, in association with the function of the intrinsic muscles, and under a myriad of circumstances involving varying distance and direction; yet, to meet the demands of binocular single vision, this balance must be of sufficient accuracy to satisfy the requirements of a mathematically exact horopter. Furthermore, no two cases of heterophoria are exactly alike, each having its own peculiar individuality, ever changing with the nervous status of the patient.

It is unfortunate that heterophoria has received such a small share of the study it deserves, and that its teachings are so little used in the practice of ophthalmology. I am convinced that there are many students well grounded in the principles of ophthalmology, having a good working knowledge of muscle balance, who, except in very apparent cases of asthenopia of muscular origin, seldom utilize the tests for heterophoria. Some ignore heterophoria as the cause of asthenopic symptoms, while the opposite extremists attribute many of man's ills to a few degrees of imbalance. Fortunately, however, the subject of heterophoria has had the earnest consideration of many of our most untiring scientific investigators, who have left us the golden fruits of their labors.

The excuse for occupying the reader's time with this much discussed subject is the fact that from one-quarter to one-third of all cases of asthenopia are due to anomalies of muscle balance, which cannot be cured by the correction of refractive errors alone. Reber[1] says: "A review of 1,000 refractive and muscular cases in the writer's private practice indicates that about 70 per cent of them were relieved of their symptoms by the use of their correction alone. The remaining 30 per cent required some manner of attention to their oculomuscular status to bring about more or less complete relief."

What are we doing for this unfortunate class of patients? It is for the purpose of calling attention to this very important subject in every day practice of ophthalmology, especially in refraction, and in the consideration of the causes of asthenopia, and with the hope that some of the phases of the subject may be elucidated, rather than to present any new findings, that this paper is presented.

In order to be able to recognize anomalies in muscle balance, we should familiarize ourselves with the normal functions of convergence and accommodation and their relations to each other, and to achieve this knowledge, the student should adopt rules for observing the necessary data; for it is only by careful observation of the normal that we are able to detect the abnormal, and it is especially necessary to form the habit of methodically recording the data thus found, for the sake of thoroness, for your own information, for the patient's sake and for the advancement of scientific knowledge.

I venture, therefore, to enumerate below certain data to be sought during the routine examination for refraction. Certain essential tests should be made in every case, and most, if not all, should be utilized in asthenopic cases, especially those in which the patients have not definitely improved after wearing the refractive correction. Except when it is otherwise stated, the tests should be made with the proper ametropic correction worn.

ACCOMMODATION.

The determination of the accommodative power of each eye should be a routine in refraction, regardless of the patient's age. Many of our failures in refraction work have been due in part to a lack of this important datum. The punctum proximum (P.P.) is the nearest point at which, with maximum effort of the ciliary muscle, distinct vision is possible. A suitable test object, amply illuminated, and corresponding in size to that of Jaeger 0.5 diopter or larger, if necessary, depending on the visual acuity, and a 50 centimeter rule are ample equipment. The fine short line 1/3 by 3 mm. in India ink on white cardboard, as devised by Duane, is especially adapted. I myself have found different sizes of black horsehair stretched across white cardboard quite as satisfactory. The test object is ad-

vanced toward the eye, the other eye being covered, until the image begins to blur. This locates the punctum proximum and its distance from the anterior focus of the eye (from 13 mm. in front of the cornea) or from the plane of the trial frame is the linear measure of the maximum accommodation of the eye. Since 100 cm. is the unit focal length, 100 divided by this distance (100/P.P.) equals the diopters of accommodation represented. Each eye should be thus tested and the results recorded as part of the necessary data in the consideration of the relation of accommodation to convergence. If mathematic accuracy is desired, the measurement should be made from the nodal point rather than from the anterior focus, but the latter is more convenient. The punctum remotum (P.R.) is the point at which the eye is focused when in a state of complete repose. In emmetropia, it is at infinity; in myopia, within infinity or at a finite distance; and in hyperopia, it is beyond infinity or virtual and its distance negative. Since the refractive power (R.) is the inverse of the focal distance (P.R.) measured in meters, R. = 1/P.R., giving in diopters the plus value of P.R. in myopia and the negative value in hyperopia. These two distances (P.P. and P.R.) may be expressed in diopters, and their difference represents the amplitude of accommodation. Donders, Duane, Jackson and others have recorded abundant data on normal accommodation at various ages, the graphic curves of which are familiar to all. Duane's[2] show a gradual retrogression of the punctum proximum from the age of 8 or 10 to that of 51, after which the retrogression is very slow, changing only 0.5 diopter in ten years.

Among anomalies of accommodation may be mentioned[3] insufficiency of accommodation, the punctum proximum being constantly farther away than normal for the particular age; excessive accommodation; inequality of accommodation of the two eyes, and a sluggish or ill sustained accommodation. As causes may be mentioned toxemia, nasal reflexes, vascular hypertension, neurasthenia, and excessive use of eyes and undue and unequal rigidity of the lens.

RELATIVE ACCOMMODATION.

Relative accommodation is the amplitude of accommodation for a given amount of convergence. The greatest amount of accommodation for a given convergence is measured with the strongest minus sphere with which the object can be seen distinctly, and is known as the positive relative range of accommodation. The negative range of relative accommodation is measured by the strongest plus sphere possible without blurring the image. At 6 meters, the emmetropic eye free from presbyopia will accept a minus 3 D. sphere or more and maintain distinct vision; but for obvious reasons will not accept any plus sphere. Consequently, for distance there is about 3 diopters of positive and no negative relative range of accommodation. Similarly, at one-third meter, the positive and negative ranges are found; but from the positive must be deducted and to the negative added plus 3 diopters, which represents the normal convergence at one-third meter. In ametropia, a disturbed relationship exists between accommodation and convergence, which relationship rather than the ametropia per se is the principal cause of asthenopia. In hyperopia and hyperopic astigmatism, there is anatomically excessive negative and reduced positive relative accommodation, and in myopia and myopic astigmatism the reverse is true—an excess positive and a less negative relative accommodation. A person with hyperopia of 3 diopters may have 3 or more diopters of positive and 3 of negative relative accommodation for distance and a similar disproportion for near. A person with myopia of 3 diopters has no negative relative accommodation for either 6 meters or one-third meter, and a proportionately large positive range of accommodation.

TONICITY.

The natural anatomic position of a pair of eyes during sleep, drunkenness, anesthesia or death is that of diverg-

ence, and according to LeConte[4] and Prentice ranges up to 20 degrees or more. This tendency to divergence is overcome by innervation (Prentice) or tonic convergence (Maddox). There is diversity of opinion as to the importance of the tonicity test, owing in part, no doubt, to the various methods employed by different observers. This test is made in a darkened room at 6 meters, first without and afterward with the patient's correction. It is generally conceded that, in order to obviate the tendency to fusion, the false image should be such and in such position that it will fall outside the fusion area, which, according to Savage,[5] extends vertically 3 degrees upward and downward, 8 degrees nasalward, and 25 degrees temporally. The displaced images with the double prisms, bases horizontal, show a greater amount of divergence of the visual axes (more exophoria or less esophoria) at 6 meters than does the distorted image of the Maddox rod, whose image extending across the fusion area stimulates fusion convergence. In order that the vertical and oblique muscles may be as nearly at rest as possible, the light or test object should rest on the extended horizontal plane. Each eye should be tested separately, the image of the other eye being undisturbed. Under these conditions, an exophoria of from 0 to 1 degree, in my opinion, is within the normal. This "physiologic exophoria" is less if the test object, a star, for instance, at infinity, is used instead of the light at 6 meters, where there may be, in the latter case, as much as 0.16 diopter of associated accommodation inducing slight convergence. The nearer the test object is approached, the greater the amount of this exophoria which fusion convergence compensates for under ordinary demands of binocular single vision.

The vertical tests for the vertical muscles should show the images in perfect alignment when the double prisms are turned bases vertically. In order to obviate the tendency to fusion of the lights in these positions, a prism *base in*, sufficient in strength to place the image of the eye examined beyond the fusion area, may be in some cases better suited for the vertical muscle test than is the double prism.

The tonicity test at 6 meters taken alone is of little value except when correlated with that of duction, convergence and accommodation, and especially with the refractive error.

COVER TEST.

This test, while not accurate in amount, is most responsive, the most convenient, and the quickest test for heterophoria of considerable degree, and is both an objective and a subjective test. The covered eye wanders in the direction and to the position of rest, and when uncovered, the redress toward the point of fixation is easily noted by the observer, and the seemingly reverse motion of the object by the patient. This test is especially serviceable in roughly determining the existence of conjugate muscle imbalance, especially convergence insufficiency and excess for near.

CONVERGENCE.

Convergence is the angular relationship of the visual axes. The distance of the intersection of the visual axes from the base line connecting the centers of rotation divided in to a hundred, measures in meter angles the amount of convergence of each eye, and this multiplied by 7 measures approximately in degrees the amount of convergence. To be more accurate, one-half the interpupillary distance divided by the distance of the object equals the sine of the angle.

The punctum proximum of convergence is the point of intersection of the visual axes during maximum convergence. Duane finds this to be normally about 7.5 cm. from the base line connecting the centers of rotation, representing about 13.3 meter angles of convergence. The punctum remotum of convergence is the intersection of the visual axes when at the least convergence (or greatest divergence). The difference between the maximum and minimum convergence represents the amplitude of convergence and is measured in meter angles, prism diopters, or degrees.

ACCOMMODATIVE CONVERGENCE AND FUSIONAL CONVERGENCE.

In order to satisfy the requirements of binocular single vision, the visual axes must converge to the point observed with an astonishing accuracy. But the stimulus of accommodation alone does not normally accomplish all of this divergence, since the cover test at the reading distance shows that the covered eye deviates outward. This outward deviation is the measure of reflex, or fusional, convergence, and should bear a relationship of about 1 to 3 to the total necessary for the point observed. Maddox allowed three quarters of a meter angle of associated convergence for each diopter of accommodation, leaving 0.25 meter angle to be cared for reflexly. The amount of this reflex increases as the fixation point approaches from a distance, except that when it approaches near enough to the eye to tax the accommodation, then accommodative convergence is coordinately stimulated excessively, and thereby furnishes a proportionally greater percentage of the demanded convergence than does fusion.

To measure accommodative convergence, the conditions of dissociated images outside the fusion center, one image being undisturbed as in the tonicity test, must be fulfilled, the eyes must be accommodating and any presbyopia corrected. To this end, the test object should be small in proportion to the visual acuity, to assure the precise accommodation. The small type, 10 or 12 point horizontal line with a short, broad vertical line drawn across its center, but not long enough to be refracted into the fusion area, helps to induce the proper accommodation, and its size and direction assist the patient in determining when their images are properly alined. The strength of the prism necessary for this alinement measures the reflex component of convergence, and the total convergence for the point (3 prism diopters for one-third meter) less the amount of this reflex measures the accommodative convergence. This convergence for one-third meter distance is 3 meter angles, or about 19 prism diopters for each eye. Of this, accommodative convergence supplies normally about 13, and fusion convergence the remaining 6 prism diopters. The asthenopia incident to presbyopia is more often due to disturbed accommodative convergence than to insufficient accommodation. Maddox[6] implies this when he says, "The most important minute of a refractive consultation is that in which we deliberate what reading lens to order."

AMPLITUDE OF CONVERGENCE.

If, while fixing at the near point of accommodation, the double rotating prism, base out, is increased in strength to the point of diplopia, maximum convergence is induced. This, added to the prism divergence for distance, measures the amplitude of convergence, which is normally about 14 meter angles.

DUCTION.

Duction tests taken alone are of little value, but, considered in connection with the other tests, are often invaluable. For example, when the duction tests are found normal in connection with abnormal tonicity, innervational rather than anatomic muscle deficiency may be suspected. The monocular phorometer, with prism base *in*, gradually increased in strength to the point of diplopia, measures adduction; similarly, with base *out*, it measures abduction; with base *up* and *down*, it measures superduction and subduction, respectively. Each test should be repeated until uniform answers assure accuracy. Normally, the external rectus overcomes a prism of 6 or 7 degrees, the internal rectus 12 to 30 degrees, depending on practice, the superior and inferior recti 2 degrees each. The tonicity should be considered in determining the amount of abduction and adduction. The amount of esophoria should be added to abduction and deducted from adduction, and the amount of exophoria deducted from abduction and added to adduction.

FUSIONAL CONVERGENCE.

Fusional convergence should be determined at one-third meter or, rather,

at the ordinary working distance. A vertically placed line of letter of the alphabet holds the patient's attention and helps to induce accommodation. With each eye fixating this object at the working distance, the rotary prism over one eye, base *in*, increasing in strength to the point of diplopia, measures the negative, and the same, base *out*, the positive fusion reserve. The amount of positive fusion reserve is important in cases of excess tonic exophoria and physiologic exophoria, and that of negative reserve in esophoria and convergence excess. According to Landolt, for comfortable vision no more than from one quarter to one third of the amplitude of convergence should be in constant demand.

VERSION.

Version may be determined by the perimeter or tropometer, and, according to the painstaking observation of Duane, the average readings are 53 degrees inward, 43 upward, 51 outward and 63 downward.

CYCLOPHORIA.

Cyclophoria has been given considerable importance in the writings of Savage,[5] who considers it a frequent cause of asthenopia. Impaired action of any one of the ocular muscles may, when the eyes are turned in certain positions, cause cyclophoria—even the lateral muscles; but it is the obliques which, when impaired, cause the greatest tilting of the vertical axes. These axes normally diverge upward, the degree of divergence increasing as the eyes are directed downward, more when directed upward and outward and upward and inward. The divergence in the primary position is about 3 degrees, and increases on convergence of the visual axes. The simplest way to measure the degree of divergence of the vertical axes is with the double prism base horizontal, and a straight horizontal line, the two vertical images tilting downward nasalward indicating a normal tilting of the vertical axes of the eyes outward.

The cyclophoria test is one of the most important heterophoria tests, especially in dealing with the functions of the obliques.

The duction tests in this connection may be applied both at 6 meters and at one-third meter by the use of a Maddox rod with vertical axis over each eye, tilting each rod outward and inward until diplopia is imminent.

FIELD OF FIXATION.

Even slight variations in the field of fixation may have an important significance in determining the pathologic condition present.

While all tests should be made with the eyes in the primary position, it is necessary also to repeat them in the cardinal and oblique positions, where the limitation of motion is most exaggerated, indicating the muscle or group of muscles or the innervation at fault.

The subject of heterophoria was chosen with the hope that the essay may elicit a free discussion and criticism of its contents; that the members of the section may become more concerned with the importance of the rôle of muscle imbalance as the cause of asthenopia, and that the section may be induced to devise some plan for standardizing muscle imbalance tests and adopt a nomenclature of the special terms used in dealing with this vast problem.

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PERIMETRY: VARIABLE FACTORS INFLUENCING THE BREADTH OF THE COLOR FIELDS.

PROF. C. E. FERREE AND GERTRUDE RAND, PH.D.

BRYN MAWR, PA.

This is the first of a series of papers upon perimetry, and deals particularly with the factors upon which thresholds of light and color perception depend. It calls attention to the irregularities of color sensitivity for different colors and for different meridians of the visual field.

The difficulty of getting reproducible results in determinations of the color sensitivity of the peripheral retina is a common complaint among laboratory and clinic workers. The actual distribution of retinal sensitivities is only one of the factors which influence the results of the perimetric or campimetric determination. By varying the conditions under which the work is done, the zones of color sensitivity may be made to have almost any extent within the field of vision, to vary radically in shape, and even to reverse their order of ranking as to breadth.

The difficulty of obtaining reproducible results is so great as to lead many seriously to question the value of the perimetric or campimetric determination in the work of diagnosis. Their value in diagnosing and checking up the course of some of the most serious affections of the eye is readily conceded, however, provided the needed precision can be obtained. The need of greater precision of work in the laboratory, while less important to human welfare, is no less insistent. These combined needs led us several years ago to make a study of the variable factors which influence the chromatic response, the details of which study are still in progress. Some of these factors pertain to the stimulus; some are peculiar to the response of the eye itself. All may be standardized and controlled. The normal eye is highly sensitive and complex in its responses, but not inherently erratic. While the abnormal eye may be more erratic—one of the symptoms, it may be, of its abnormality—there should be, so far as we can see, no essential difference in the technic of testing and studying its functions.

The theory and practice of clinic field taking seems up to the present time to have been based on the following assumptions: (1) The far periphery of the retina is blind to color, that is, there are definite limits or boundaries of the sensitivity to colored light. These may be called the *actual* limits of sensitivity. The limits as determined, the apparent limits, may or may not agree with the actual limits, depending upon the conditions under which the work is done. (2) The factors affecting the apparent limits of sensitivity, when the fields are taken with pigment colors, are the size and the coefficient of reflection of the stimuli employed. A contraction of the fields, taken under standard conditions of control for these two factors, means then an actual change in the distribution of sensitivities. (3) Sensitivity decreases from the center towards the periphery of the retina, in a fairly regular manner in any given meridian, and the rate of decrease for the same color is approximately uniform from meridian to meridian over a considerable range near the limits of sensitivity. Irregularity of contraction, resulting in a change in the shape of the field, is not therefore to be expected as a phenomenon of the normal eye. And (4) the field of sensitivity is wider for blue than for red. The limits of the fields should not then be expected to interlace, or to reverse their order of ranking as to breadth, without some pathologic or other disturbance in the distribution of sensitivities.

A study of the distribution of sensitivities in the peripheral retina and the factors which affect the apparent limits of sensitivity, shows that these assumptions are not correct. The far periphery of the retina is not blind to blue and red, nor is the sensitivity in this part of the retina greater for blue than for red; the decrease of sensitivity from the center towards the periphery of the retina is very irregular in any given meridian, and the rate of

decrease is very different from point to point in the different meridians; the apparent limits of sensitivity are a function not of two but of several variables. All of the field changes noted above as pathologic may occur, and do occur, as the result of nothing more serious than a defective control of the variable factors which affect the sensitivity of the peripheral retina to color.

The variable factors which affect the sensitivity of the peripheral retina to color, and therefore the results of field taking are, so far as we have been able to discover, the wave length and purity of the stimulus, the intensity of the stimulus and the visual angle, length of exposure of the eye, the method of exposure (moving or stationary stimulus), accuracy and steadiness of fixation, the intensity of the general illumination of the retina and its state of adaptation, breadth of pupil, and the brightness of the preexposure and of the background or surrounding field. Only a few of these can be considered in the present series of papers. For the fuller treatment a bibliography is appended. The most important of these factors from the standpoint of the work of the office and clinic are the intensity of the stimulus and the precision of its control, the brightness of the preexposure and of the surrounding field, the intensity of the general illumination, and the accuracy and steadiness of fixation.

In the present paper, the effect of variations in the intensity of the stimulus alone will be discussed. The discussion of the effect of other factors will be given in later papers. Obviously, the effect of any uniformly acting factor on the size and shape of the color fields and their order of ranking as to breadth will depend upon the type of distribution of sensitivities in the peripheral retina. The first step toward an understanding of the normal color fields and their variations under the influence of different conditions of work, therefore, is a study of the distribution of sensitivity in the peripheral retina of the normal eye. Results will be given illustrative of this distribution, and the effect of variations of intensity on the normal color fields will be discussed and explained in terms of these results. In making this selection of a factor, intensity is regarded as typical. That is, whatever is true of the effect of intensity should be, true, also in a general way, of the effect of any other uniformly acting factor which produces large variations in the breadth of the color fields.

The Intensity of the Stimulus.

By a sufficiently wide variation of this factor alone, the fields of color sensitivity may be made to have almost any breadth in the field of vision, to differ radically in shape, and even to change or reverse their order of ranking as to breadth,—changes of a type and magnitude to which the clinician might ascribe a grave and important pathologic significance. For example, with very high intensities of stimulus the limits of red, yellow and blue are coincident with the limits of white light vision. Green can not be made to have so wide an extent. With stimuli of medium intensity, and of the relative energies found in the prismatic spectrum of a Nernst filament, the limits are concentric and in the order from widest to narrowest of red, yellow, blue and green. With stimuli of medium intensities of equal energy (equal physical intensities) the limits of red, yellow and blue interlace or crisscross. The limits for green again are narrower. The limits for pigment stimuli may be either interlacing or concentric in the order from widest to narrowest of red, blue and green; or blue, red and green, depending upon the pigments used and the intensity of light falling upon the perimeter arm.

It seems only fair to conclude, therefore, that the conventional clinic rating of the limits from widest to narrowest in the order of blue, red and green is a function of the relative and absolute intensities of the stimuli employed, as well as of the actual distribution of sensitivities. A change in the intensity of the stimulus not only changes the limits but, because of the irregular distribution of sensitivities in the different meridians, causes a marked change in the shape of the

fields; and because of changes in the ratio of sensitivity to the different colors in the same meridians, a change in their order of ranking as to breadth. Without great precision in the control of intensity, it is obvious that reproducibility of result can not be obtained, and little significance can be attached to extent or shape of field, to order of ranking as to breadth of field, or to any variations from time to time or from person to person in these important features.

The effect of changes in the intensity of the stimulus both on the extent and shape of the color fields varies with the order of magnitude of intensity employed. For medium and low intensities, the effect of a given amount of change is very much greater than for high intensities. This is an obvious corollary of the type of distribution of sensitivities found in the peripheral retina. That is, in passing from the center towards the periphery, the decrease in sensitivity is comparatively slow and gradual in the paracentral retina; it is much faster and more abrupt in the mid pheriphery; and very abrupt in the far periphery. It requires, therefore, comparatively large changes of intensity in stimuli of high intensity, which carry the limits of sensitivity into the far periphery, to produce a significant change in the limits; not so great a change in the stimuli of medium intensity; and a still smaller change in stimuli of low intensity. This effect varies greatly, however, for the same color in the different meridians, and for different colors in the same meridians. For the stimuli of medium and low intensities used in the office and clinic, the effect of change of intensity is very marked indeed, both on the extent and shape of the fields of sensitivity.

We have stated that the order in which the fields may be found to occur, ranked with regard to breadth, depends upon the actual distribution of sensitivities and upon the relative and absolute intensities of the stimuli employed. That it depends upon the relative intensities should be more or less obvious, provided of course that the relative differences of intensity are great enough to overcome or reverse the actual differences in sensitivity. In support of the statement that it depends also on the absolute intensity, maps will be shown in a later paper in which for the same eye and a constant ratio of intensity of stimuli, the limits for red and blue in some cases interlace or crisscross; in others they are concentric or nearly so—the limits for blue lying outside of the limits for red; or conversely the limits of red lying outside of the limits for blue—the difference in result depending solely upon the absolute intensities of the stimuli employed. The determinations were made with the Hering standard pigment papers presented to the eye by means of the perimeter described in a preceding paper,[1] with the preexposure and surrounding field of the brightness of the color, the only variable being the intensity of illumination of the perimeter arm.

The Chromatic Thresholds of Sensation From Center to Periphery of the Retina.

As we have already stated, the effect of such factors as intensity on the extent and shape of the color fields and their order of ranking as to breadth can be better understood when a thoro knowledge is had of the actual distribution of sensitivities from point to point from center to periphery of the retina. In order to show this distribution; we have made determinations of the threshold of sensation (the amount of light required just to arouse the color sensation) with spectrum lights and under proper conditions of control, for the different colors at near lying points in the different meridians. A graphic representation of the results of these determinations for two meridians, the temporal and the nasal, is given in Charts 1-4. In these charts the degree of excentricity is plotted along the horizontal coordinate, and the energy or intensity values of the threshold in watts (10^7 ergs per second) are plotted along the vertical coordinate. The values of the thresholds for blue are represented by the continuous line; for yellow by the dotted line; for red by the dash line; and for green by the dash-dot line. In case of red, yellow

and blue, it will be remembered from statements made earlier in the paper, the limits of sensitivity for lights of high intensities coincide with the limits of white light vision. This, however, was not the case for the green stimulus. By no increase of intensity were we able to make the limits of green sensitivity coincide with the limits of white light vision.

In charts 3 and 4, the above values from the center of the retina, thru the region of gradual decrease of sensitivity, are plotted on a larger scale, a tenfold amplification. This was done, because when plotted on the scale used in charts 1 and 2, the curves fell so closely together, that the relative sensitivities to the four colors are not clearly represented. This is, the range of values for the threshold from the center to the extreme periphery of the retina is so great, that in charts 1 and 2, in which the entire range is represented, a scale value had to be chosen for the vertical coordinate which is so large as almost to obscure the smaller differences in relative sensitivity to the different colors in the paracentral retina, the region of gradual decrease in sensitivity.

Space can not be taken here for a full discussion of the results of these determinations. For a more detailed statement of results and a fuller discussion of their bearing on points of theoretic and practical importance, the reader is referred elsewhere.[20] The following points, however, may be noted in connection with the present paper:

(1) *The great range of sensitivity from the center to the extreme periphery of the retina.* For example, in the temporal meridian the sensitivity to red is 900 times as great at the center as at the extreme periphery of the retina; for yellow 1650, for blue 3280, and for green 3380 times as great.

(2) *The great irregularity in the decrease of sensitivity* which is found in passing from the center to the periphery of the retina. This irregularity, moreover, differs greatly in the different meridians. From these irregularities, it is obvious why the shape as well as the extent of the fields of sensitivity change with the change of intensity of the stimulus light. That is, depending upon the different rates of decrease of sensitivity in the different meridians, a given increase or decrease of intensity of the stimulus light causes respectively different amounts of extension or contraction of the fields in these meridians. The result is, of course, a change of shape of the field proportionate to the amount of irregularity of the distribution of sensitivity in the different meridians.

A further obvious corollary of the irregularity of distribution of sensitivity in the different meridians is the interlacing or crisscrossing of the limits when the stimuli are so graded in intensity as to give the limits for all the colors approximately the same degree of excentricity. That is, a condition of coincident or concentric limits, would presuppose a regularity of distribution of sensitivity from meridian to meridian; irregularity inevitably leads to an intersection or crisscrossing, when the conditions under which the determinations are made are such that the fields have approximately the same breadth. A frequent crisscrossing of the limits, it will be noted in charts to be given in a later paper, occurs for red, yellow and blue, when stimuli of medium intensity and of anywhere near equal energies are used.

(3) A third point is the great *irregularity in the ratio of sensitivity to the different colors,* which is found in the same meridians in passing from the center to the periphery of the retina. At some points, for example, the sensitivity to red is greater than the sensitivity to blue; at others the reverse is true. An obvious corollary of such shift in relative sensitivity is a reversal of the order of breadth of the color fields, a reversal which we have every reason to believe is not pathologic. This does not mean, of course, that reversals in order of breadth may not be of pathologic origin. It does indicate that they may occur in case of the normal eye, as the result of no more serious condition than a change in the absolute intensity of the stimulus light, or translated into terms of ordinary office and clinic practice, a change in the intensity of light falling on the

perimeter arm at the point of work—a change, moreover, no greater than may occur in the illumination of a daylighted room from noon to four o'clock on any bright winter day. That is, as the intensity of the stimulus light changes, the limits fall at different distances from the center of the retina. If they happen to fall in a region where the sensitivity is greater relative distribution of sensitivities, as the case may be. Working under these conditions, we have a chance really to find out what is normal with regard to the breadth and shape of the fields of sensitivity, and their relations for the different colors, and to check up their variations from time to time as the result of the advance or recession of a pathologic condition.

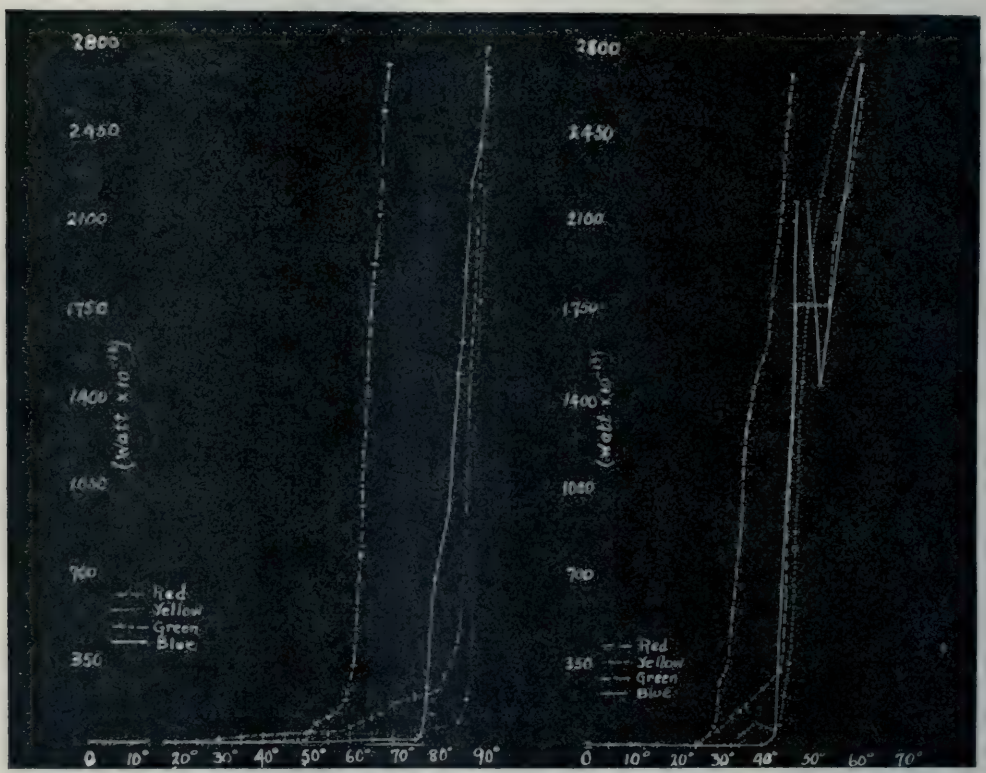

Chart 1. Chromatic thresholds for the four colors, temporal meridians.

Chart 2. Chromatic thresholds for the four colors, nasal meridians.

to red than to blue, the limits for red will be outside the limits for blue; and conversely if they happen to fall in a region where the sensitivity to blue is greater than to red, the limits for blue will lie outside of the limits for red. There is no reason to believe that these irregularities are the same in kind or degree from person to person. Obviously, the only safeguard against misinterpretation either in establishing a norm or in making comparisons with an established norm, is always to work with the same conditions of control. A difference in result will then mean an actual difference in sensitivity or in the

A further corollary of the change in the ratio of sensitivity to the different colors in passing from the center to the periphery of the retina, is the change in hue of red and green. This change is toward yellow when the observation is made with a preexposure and surrounding field of the brightness of the color, and there is a proper control of all other variable factors. If the observation is not made under these conditions, the change may be still more complicated. The change toward yellow depends upon two facts: (a) The red and green wave lengths of light have the power to arouse not

only the sensations of red and green, but also weakly the sensation of yellow; and (b) sensitivity to red and green falls off more rapidly than to yellow in the mid periphery of the retina. In the center of the retina, which is fully sensitive to red and green, the weakly aroused yellow excitation is below the threshold of sensation, i. e., too weak to be sensed in the presence of the strongly aroused red and green sensations. However, in those parts of the periphery of the retina in which the loss of sensitivity to red and green is greater than to yellow, the yellow component of the sensation comes above the threshold, and the red and green stimuli are sensed as yellowish-red and yellowish-green.

For example, in passing from the center to the periphery of the retina in the temporal meridian, the red stimulus was sensed as red from the center to about 60° by the observer whose threshold results are given in charts 1-4; from 60° to about 86° it was sensed as yellowish-red or orange; from 86° to the limits of sensitivity it was sensed again as red. Corresponding to this it will be noted (charts 1-4) that there is in this meridian a fairly close agreement in sensitivity to red and yellow from the center to about 60° (stimulus sensed as red), at which point there is a relatively sharp decrease in sensitivity to red. That is, from 60° to 86° there is much less sensitivity to red than to yellow (stimulus sensed as yellowish-red or orange). At about 86° there is a sharp decrease in sensitivity to yellow, and from this point on to the limits, a fairly close agreement again in sensitivity to the two colors (stimulus sensed as red). In the nasal meridian, the red stimulus was sensed as red from the center of the retina to about 30°; from there to about 47° as yellowish-red or orange; and from 47° to the limits of sensitivity, as red. Similarly in this

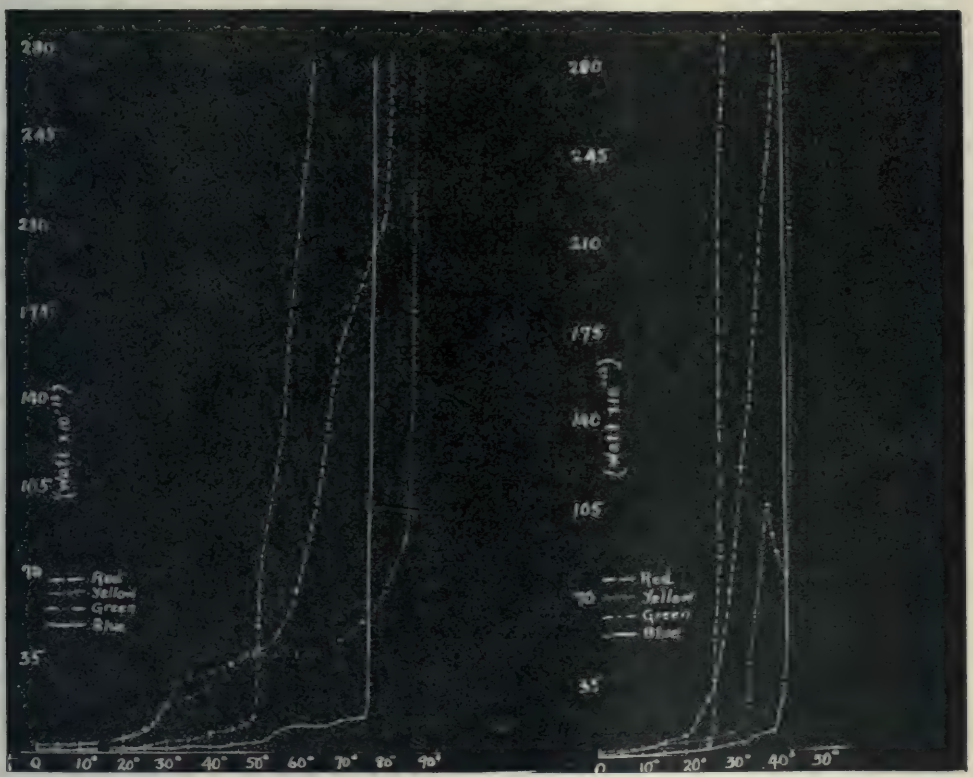

Chart 3. Chromatic thresholds (enlarged scale) for the four colors, temporal meridian.

Chart 4. Chromatic thresholds (enlarged scale) for the four colors nasal meridian.

meridian, there is a fairly close agreement in sensitivity to red and yellow from the center to about 30°; from 30° to about 47° there is a considerably greater sensitivity to yellow than to red; and from this point on to the limits, greater sensitivity to red than to yellow. In case of green, in the temporal meridian the greater loss in sensitivity to green, as compared with yellow, begins at about 51°; and in the nasal meridian at about 26°. Correspondingly, at these points the green stimulus began to be sensed as yellowish-green and continued to be sensed in this hue until the limits of sensitivity to green were reached, from which point on, for a short distance, it was sensed as unsaturated yellow.

These changes of hue are the normal changes for spectrum or pure red and green in passing from the center to the periphery of the retina when, as we have already stated, there is no achromatic effect of preexposure and surrounding field, that is, when the preexposure and surrounding field are a gray of the same brightness as the color, and when the general illumination of the room is held constant. In a later paper, the changes produced by a preexposure and surrounding field lighter or darker than the color, and by a variable illumination will be given.

In chart 2, nasal meridian, a gap will be noted in the curve for blue not present in the curves for the other colors. In this area is represented a peculiar type of color blindness, small areas or spots which are found, so far as we have been able to discover, in all or most peripheral retinas. In these spots, the blindness is to one color alone. The spot is fully sensitive to all of the other colors. Moreover, it shows no deficiency in the cancelling, after image and contrast reactions of the color in question. That is, in this area the stimulus, altho it is not sensed as color, has just as much power to cancel the complementary color and to arouse the complementary colored after image as it has in the immediately surrounding retina. These spots seem not to be subject to change and apparently are not pathologic.

An examination of a large number of observers shows, that eyes may differ widely with regard to the number and size of these spots, their location and the color affected. A successful search of the peripheral retina for the presence of such spots requires a means of making a rather minute investigation of the retina from the center to the periphery in a number of meridians. A more detailed report of the study of this phenomenon has been reported in an earlier paper.[18] F. Schumann[24] reports a case (his own) in which the whole retina is affected by this type of color blindness. In case of these small areas, also in the Schumann case, the defect which renders the eye blind to the color in question seems to be located posterior to the functional level which is the seat of the cancelling, after image and contrast reactions, else these reactions would be disturbed in some proportion to the disturbance in the power to sense the color in the positive sensation. It would be of interest to know whether the cancelling, after image and contrast reactions are retained also in the relative scotomata of pathologic origin. This point will be made the subject of future study.

CONDITIONS UNDER WHICH THE THRESHOLDS WERE DETERMINED.

(1) The colored lights were taken from the spectrum and special precautions were exercised to secure a high degree of purity. There are two reasons for this in an investigation of the kind here undertaken: (a) The stimuli should be as homogeneous as possible with regard to the visible wave lengths. The presence of alien visible wave lengths affects the results of a determination of chromatic sensitivity in two ways. Thru physiologic inhibitions and interactions it decreases the amount of the color response; and it increases the energy measurement. In both of these ways the value of the threshold is raised by the presence of impurities in the stimulus light. And (b) the stimuli should be free from the infrared and ultraviolet radiations, which would affect the thermopile used to measure the intensity of light, but not the eye.

The stimuli employed were a narrow band of red in the region of

670μμ.; of yellow in the region of 581μμ.; of green in the region of 522μμ.; and of blue in the region of 468μμ. The breadth of the analyzing slit used in isolating these bands was maintained constant at 0.5 mm. The ranges of wave lengths obtained were approximately 660-680μμ.; 575-587μμ.; 518-526μμ.; and 464-474μμ. The spectrum was gotten and the different wave lengths were presented to the eye by means of an apparatus[12] already described. In every case the light was examined for impurities at the analyzing slit by means of a small Hilger direct vision spectroscope provided with an illuminated scale. When found, impurities were absorbed by thin gelatins selected so as to cut out as little as possible of the useful light. These gelatins were placed over the analyzing slit and were held in position by short clips fastened to the front surface of the jaws, the edges of which formed the slit.

(2) The determinations of the thresholds were made in energy terms. Measurements were made at two places: at the analyzing slit and at the eye. The method of making the energy measurements by means of a thermopile has been described in previous papers.[25] The values given in charts 1-4 are total amount of light entering the eye.

(3) The field surrounding the stimulus and the preexposure were always maintained as nearly as possible at the same brightness as the stimulus at the threshold value of sensation. These surfaces were made from the Hering standard gray papers. It was found to be necessary to change the brightness of the surrounding field and preexposure frequently for each stimulus, because the brightness value of the color at the chromatic threshold changed quite rapidly from the center toward the periphery of the retina. There were two causes for this change: (a) The intensity of light had to be increased a great deal from center to periphery to give the chromatic threshold from point to point; and (b) the achromatic value of the colors does not remain the same from the center to the periphery of the retina (the Purkinje shift of the peripheral retina). The match of color to gray was made in every case for the point of the retina under investigation.

(4) The illumination of the room was kept at a constant value. Its value on the working surface was 30.49 foot candles. Two features are necessary for this control: (a) A means must be had of detecting small changes of illumination. This may be accomplished by a portable photometer of the Sharp-Millar or Macbeth types furnished with a daylight screen, or of the simpler type described by the writers in a previous paper.[13] And (b) a means must be had also of producing small variations in the illumination of the room, else the changes due to fluctuations in the external light can not be compensated for with the precision and minuteness of control that is needed. This is accomplished in our optics room[23] by two systems of thin white curtains running on spring rollers beneath the skylight. Large changes are produced by a light proof curtain. One of the systems of white curtains and the light proof curtain run lengthwise of the room; the other system of white curtains runs across the room. By means of the white curtains, either small local or small general changes can be produced in the illumination of the room; and by means of the light proof curtain, larger changes may be produced ranging from full illumination to the darkness of a moderately good dark room. The light proof curtain is of a breadth equal to that of the room and runs in a light tight boxing. The white curtains are narrower and are made to overlap at the edges. These latter curtains run on wire guides to prevent wrinkling or sagging. Above these curtains are pivoted two large diffusion sashes of glass, ground on one side completely filling the skylight opening. These sashes diffuse the light in the room, giving an even distribution of illumination and rendering, because of that fact, an even and precise control easier to accomplish.

(5) The results were made independent of the size of the pupil. Breadth of pupil affects the results of

a determination of the sensitivity of the peripheral retina in the following ways: It influences the clearness of imaging, the amount of light entering the eye, and, by limiting the angle at which the beam of light may enter the eye, the degree of excentricity at which an image may be formed on the retina. Independence of change in size of pupil was especially needed in this work, because of the large variations in the intensity of light used. Such control is very easy to accomplish with the means of presenting the light to the eye that is used in our spectroscopic apparatus. All that is needed is to keep the image that falls on the pupil of a constant size and smaller than the pupil thruout its entire range of variations in the given series of experiments. Not only can this variation be determined in preliminary experiments as a guide to the size of image that is needed, but the image itself can be compared with the pupil at each observation.[14]

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NOTES, CASES AND INSTRUMENTS

CABINET FOR GALVANIC ELECTRICITY.

M. E. Smukler, M.D.

PHILADELPHIA.

The increasing use of galvanism by the ophthalmologist has led me to design a simple and economical wall cabinet for those having access to alternating current only.

The practical and economical advantage of this cabinet is, that it is so constructed that the dry cells are concealed, and yet so easily accessible that

Fig. 1. Cabinet for galvanic electricity showing switch board and galvanometer. (Smukler.)

they can be changed in a few minutes by the physician himself, when the current is exhausted.

This arrangement obviates the necessity of installing an expensive motor generator to change the alternating current into direct current. It is not advisable to use a rectifier to change the alternating into direct current as it produces a pulsating galvanic current (rapid interrupted pulsating galvanic current) which is not suitable for the eye.

The cabinet (Fig. 1) is so constructed, that twelve No. 6 dry cells are housed so that they are concealed by a hinged door (Fig. 2) holding a marble panel, on which is mounted a milliamperemeter with a switch to throw it in or out, a twelve point selector switch, so arranged that the strength of one to twelve cells may be employed at the will of the operator, each successive point adding a cell, and two binding posts.

Below is a drawer for housing accessories. The hinged door has a lock and key.

The cabinet may be used as follows:

1. For negative and positive galvanism, as suggested by Dr. S. Lewis Ziegler. Here it is exceedingly useful, as the current is smooth and continuous, and the dosage the patient gets registers on the meter.

2. To supply the current when using a small Lancaster hand magnet (made to be used with eight or twelve

Fig. 2. Smukler's cabinet open to show arrangement of cells.

dry cells) which requires 12 amperes of current and has the resistance of about 1 ohm.

3. For corneal electrodes—Wirtz or Ziegler's.

4. Various diagnostic lamps.

EIKONOSCOPY.

CHARLES D. JONES, A.B., M.D.
BOSTON.

Criticism of the terms used in ophthalmology to designate what is usually known as the *"shadow test,"* reminds us that we have not yet hit upon any word which really describes this method of examination.

A recent communication criticizes the term, *"retinoscopy,"* arguing with perfect correctness that the details of the retina are not studied in this process. The only other terms in common use, "shadow test" or *"skiascopy,"* are no better. The process is neither a study of the retina nor of shadows: it is a study of images.

Consideration of the technic makes it clear that the whole purpose of the examination is to determine the conjugate focus of the retina; or more precisely, as usually performed, to determine what lens is necessary to reduce the refraction of the eye under examination to a myopia of one diopter, supposing the examination is carried out at a distance of one meter from the patient.

If the conjugate focus of the retina is less than one meter from the eye, the image of an illuminated spot on the retina is real, and necessarily inverted, and moves in a reverse direction. In the language of optics, the image is reversed from the object, the object in this case being the illuminated spot on the retina (or choroid). On the contrary if the conjugate focus is farther than one meter from the eye, the image seen by the observer is virtual and erect, and moves in the same direction with the object.

In making the examination, the character of the image, whether real or virtual, is ignored. It is not practical to determine its shape, nor is it necessary to do so, when the study of its movement gives results far more accurate. These considerations apply to an examination made with the plane mirror. In working with a concave mirror, the results will be reversed, unless the focal length of the mirror is more than one meter, and such long focus mirrors are not used.

It is a bad habit to change old names, but the writer would suggest, inasmuch as the whole process is a study of images, that if a change is to be made, the term, "Eikonoscopy" be selected.

VELONSKIASCOPY DETERMINATION OF PRINCIPAL MERIDIANS OF ASTIGMATISM.

EDWARD J. BROWN, M.D.
MINNEAPOLIS.

Since reading in the March number of Ophthalmic Literature the description of Trantas' subjective shadow test for the determination of the principal meridians of astigmia, a careful test of the method has convinced me that it has great value. Looking intently at a point of light or even a larger light, one passes back and forth before his pupil in the different meridians a probe or wire, and he will see a shadow of the wire passing across the light if he has a refractive error, in myopia with the movement of the wire, and in hyperopia against it. With an intelligent patient who has the faculty of close observation, by trying out the various meridians, first that in which the shadow is most definite and clear cut, and then the meridian at right angles, the exact strength of the required lens, to an eighth of a diopter, and the exact axis of the cylinder may be determined. My observation is that the claims of the discoverer of this method (Trantas) are not overdrawn.

Unfortunately, compartively few of our patients are both intelligent and capable of acute observation. For those who are not so capable, I have found the use of the stenopaic slit much easier and more delicate. With the latter, the light seems to move

either with or against the movement of the slit if there be a refractive error, and a slight but easily detected shadow comes over one or other part of the light. When such movement has disappeared in all meridians, emmetropia has been achieved.

For coarse and rapid work, a light two or three centimeters in diameter may be used, but for fine work, the light should pass thru a screen not over three millimeters in diameter. The wire or the slit should not be wider than one-half millimeter. It is a decided advantage to have the room darkened.

My first patient examined besides myself, was one having over three diopters of mixed astigma, and the nature of the case and the approximate axis of the required cylinders was determined with almost unbelievable celerity. My last case, a young girl wearing R. —4.50 —.25 c. 180; L. —4. —.25 c. 180, V. 20/15 plus, under scopolamin showed definitely with this test: R. —5; L. —4.25—.50 c. 180, and a plus or minus one-eighth in either meridian would cause a reversal of the shadow.

Carrying my modification of the Trantas method of subjective determination of the refraction, and especially of the amount and axis of the astigmia, to its logical conclusion, I have found that a small perforation (1/50 of an inch or 1/2 millimeter) is greatly superior either to the wire (Trantas) or to my stenopaic slit. With such a sight hole in either a thin card or a metal disk, the patient has only to slightly move the perforation in different directions to secure very definite movements of the point of light either against or with the movement of the card. The Trantas method of subjective refraction is especially valuable in cases where, as in a patient whom I examined yesterday, the cornea is so scarred from old pannus that objective skiascopy is of no value.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

DETROIT OPHTHALMOLOGICAL CLUB.

January, 1922.

Dr. Neil Bentley, President.

Accidents in Cataract Operations.

Dr. Eugene Smith: Among the accidents which happen during cataract operations, none is more provoking than loss of vitreous before delivery of the lens, particularly so if dislocation of the lens also happens.

Mr. W., aged 82; sclerosed lens; preliminary iridectomy; eye deep set; slightly unruly patient; incision small; enlarged with scissors; lens wedged in cut. Attempt to aid expulsion with spoon broke off the upper one-third, or one-half of a very friable lens, contraction of the eye muscles caused a loss of a couple of drops of vitreous and dislocation of the lens remnant into the vitreous chamber. Removal with a loop or spoon seemed too dangerous and the eye was dressed as usual after such operations. The case progressed satisfactorily and with very little reaction.

Some time since, I read of a suggestion to let a couple of drops of vitreous escape thru a wound in the sclera and break up i.e. make a discission of the lens thru the posterior capsule; the reduction in amount of vitreous making room for swelling of lens matter, and reducing the danger of subsequent reaction, and on this suggestion I acted. I had also in mind a case seen many years ago in the clinic of Thos. Reid of Glasgow. The operation had been made to promote absorption of senile cataract by discission thru the posterior capsule. The case had the remnant of a hard nucleus swinging in the pupillary space like a teter. It was held in position by slight iritic adhesions and was evidently slowly absorbing. But such cases were slow in recovery.

A rather common accident that may happen in any incision is the getting of a fold of iris over the edge of the knife blade, usually happening just after the counter puncture is made, due to escape of aqueous and pressure of fixation forceps. An entanglement of iris into the angles of the wound when iridectomy is made is much too frequent, due to incomplete toilet; operators being apparently afraid to use the spatula in clearing the angles. Hemorrhage into the vitreous, expulsive hemorrhage, is a horrible accident —I am happy to say very infrequent. I have seen but two cases.

In reporting this case and the slight reference to other accidents, the object has been simply to excite a discussion of the subject.

Discussion. Dr. Maire: All operators who have great experience in cataract operations will occasionally meet with the accidents that Dr. Smith has enumerated. It would be a very good plan to look at the situation from two standpoints. First, in regard to the prevention of accidents by the patients themselves, and also what the operator can do to prevent them. It is a wise precaution to look our patients over before operating. A patient having a cataract, we must not assume it can be disposed of simply by an operation. We have to look at the constitutional condition of the patient, take the blood pressure and his general condition.

The condition of refraction is important. For instance, in a high degree of myopia the chances are not as good for a successful issue, as they would be in a normal case. In case of high myopia, I always have Weber's loop ready to use immediately if the case seems to require it by prolapse of the vitreous. I have never regretted passing the loop in carefully and extracting the lens. If one does not observe this precaution and is not prepared, and tries pressure to extract the lens, he will find in many cases loss of vitreous.

Dr. Parker mentioned a very important thing, that is, a good incision, and would like to add to it a good sharp knife, together with making the counter puncture at the proper place. I think if the corneal incision is made properly, with a good conjunctival flap, our chances, so far as our work is concerned, are very much in favor of a successful operation. If your counter puncture is made so that the knife passes into the sclera, you have made too large an incision, blood in the anterior chamber results and you are a little at sea as to subsequent steps.

I had two cases of cataract operation within two years in St. Mary's Hospital in which there was delayed union. There was some ciliary inflammation, and iritis. I think we will all concede that vomiting after a cataract operation is not conducive to a good result, as a rule. Subsequently, these patients had pretty fair vision.

To my mind there is no more beautiful operation than a cataract operation, when all steps have been taken properly. Some patients are very much agitated, and I make it a rule to talk quietly to them and explain what dangers there are, and how important it is for them to be quiet.

Dr. N. Bentley: I was very much struck with Webster Fox's method of handling the dislocated lens. This of course is not the dislocated lens occurring at the time of the operation, but the cases of dislocated lens that come to him without operating. He makes an incision straight across the cornea; from three to nine o'clock, and then instead of making his knife upward as we do in regular extraction, he makes it straight up towards him, the patient being of course on his back, making the incision straight across the cornea. Then making pressure, the lens comes up very neatly. He had a few operated on there and had others he showed. That incision across the cornea makes a surprisingly small scar, and they get very good vision.

He had one case where the cornea turned back with a marked prolapse of the vitreous. He used the method of snipping off the vitreous prolapse with sharp scissors, and then putting sutures at the edge of the cornea above, and it really held it fairly well.

Dr. Parker has made one suggestion, where the anterior chamber does not close readily, of wiping the

mouth of the wound with 2 per cent silver nitrat, doing it every day, and making a little rubbing at the time to get closure.

One point should be emphasized, and that is the timing the amount of your anesthesia. I have seen bad results where I felt the difficulties were due to the fact that we did not wait long enough to induce anesthesia. It takes at least 10 minutes to induce anesthesia, using the cocain every two or three minutes. I have always been inclined to feel that many cases of iritis following the operation were due really to infection, and I know it is true, that since I have adopted the technic of Smith of India, of using the bichlorid douche prior to the operation, I have very much less iritis.

Dr. Ray Connor: One cannot see any great number of cataracts extracted without seeing a large variety of mishaps. Even after the patient is safely in bed, the troubles are not entirely over. I remember, in reference to Dr. Wilson's suggestion of a general anesthetic, one patient who had already lost a single eye from a cataract extraction, and who came into the hospital with the distinct understanding that he would not take a local anesthetic. The surgeon consented to chloroform thinking that he would get thru without any nausea, and he succeeded in getting the cataract out very nicely, but shortly after the patient got into bed he had some nausea, and the bandage became stained a brilliant red with blood, and the man lost his eye completely.

Dr. Smith did not mention it, but, of course, we, all of us, have seen cases of mental disturbance. Dr. Parker reported: Following cataract extraction, the patient becomes entirely unruly, and the best thing we can do for him is to uncover his good eye and give him a chance to see that he is not totally blinded. It seems to restore his mental balance better than almost anything else.

Dr. Wilson: I suppose nobody has done any considerable number of cataract operations without meeting with considerable number of accidents. One or two points occur to me as worthy of mention. The first is in respect to the matter of anesthesia. Since Koller introduced the use of cocain, in 1884, for local anesthesia, we have practically all of us confined ourselves to that agent as a means of anesthesia in cataract extraction, and I am not at all satisfied that we have always done so wisely.

I have in process of slow and difficult recovery at this time, a cataract patient upon whom I operated several weeks ago, an old gentleman of an extremely nervous type, with some nervous and involuntary trembling motions of his face, chin and body, the type with the heavy superciliary muscle and strong features. I had the patient under observation for some time before the operation, even going so far as to bandage his eye for a few days so he might become used to it, and so that I might see how the eye tolerated the postoperative dressing.

During the extraction, as soon as the cystotomy was made, the lens came forward, as it usually does more or less, but it came forward rather strongly against the inner cornea surface. Before the iridectomy, I removed the speculum. Nevertheless, upon doing the iridectomy, there was a strong contraction of his orbital muscles, and a considerable loss of vitreous occurred, the patient meanwhile making every effort to keep quiet, and making so much effort that he was in a state of tetanic rigidity.

I waited a few minutes and tried to calm him down, talked to him, to get everything quiet, that is, previous to trying the iridectomy, but it was not of any use. Fortunately another spasm occurred, and he extracted his own lens at that moment. I don't know how much vitreous he lost, but I should think at least a drachm. There was quite a fair amount of reaction, but the point of the whole story is this: Should the operator have recognized the probable occurrence of precisely that accident, and employed an anesthetic which would have put him in a state of quietude? We make routine use of cocain as an anesthetic in prac-

tically all cases, where we might, in perhaps a larger number, very appropriately use a general anesthetic and avoid some of these complications.

I am rather of the opinion that as far as immediate and grave accidents occur, marked vitreous losses are our most serious calamities, particularly in patients of the type that I have just mentioned. I am not sure but if a patient is morphinized some of these accidents might be avoided, yet I remember morphinizing a patient many years ago, who vomited so much after the morphin that she lost her eye in consequence.

So far as the incision is concerned, it seems to me that de Wecker's contribution to the whole series of incisions was perhaps the most important and at the same time the most simple. He moved the puncture and counter puncture down practically to the horizontal diameter of the pupil. For a good many years I have not had an incision that was too small, because I almost always began either in the horizontal diameter of the cornea or not more than half a millimeter above it, and I have never seen any reason to regret an incision of that size, the apposition of which is good and the healing rapid and satisfactory. Whether it is as good as enlarging the inner angle of the incision with scissors, I am not sure. It seems to me that when you can do it all at one time, that is better surgery than to do it in two steps, and with scissors which crush the tissues more than a knife does.

I did not know that turning back of the cornea was a very common accident. I had it happen to me once, and it was very surprising at that time. The whole flap turned over like a trap door and the wound was absolutely exposed from one end to the other.

Dr. Waldeck: I call to mind one very unusual accident I had in a cataract operation two years ago. It was in a man of 70, a good patient, in whom I obtained a large conjunctival flap. Just at the completion of the extraction of the lens, there was loss of vitreous, which was not, however, a serious loss. The hyaloid membrane was incised and the conjunctiva dressed back and the wound closed. On opening the eye on the first day, it was difficult to elevate the lid. There was very little reaction, the eye was perfectly quiet, but the lid was apparently adherent, altho the chamber was formed and the wound closed. Upon attempting to raise the lid a little bit further to see what the adherence was, the chamber opened, and there was an escape of aqueous, so I immediately desisted. The next day the wound was again closed, and I was able to make a little further exploration, and found that the flap had become turned back onto the cornea and had become adherent to the upper lid. The only explanation I could offer was that in irrigating the eye preparatory to the operation, I had bruised the conjunctiva of the upper lid, so that it was sufficiently denuded to allow the subconjunctival side of the conjunctival flap to become adherent to it. It became so firmly adherent that I was forced to trim it with scissors finally, after many unsuccessful attempts to free it, which resulted in more loss of vitreous, and my ultimate result was rather low vision with some vitreous bands forming. Just what the outcome would have been, I am unable to say, because the patient died within two or three months after the operation.

Dr. Grant: Several years ago I had a Hebrew patient who was very intractable. After I had removed the lens, I had the accident of eversion of the flap. He lost quite a portion of the vitreous, and I was fearful of losing the eye, but fortunately he had good vision afterwards. The accident of having the iris caught on the knife has occurred to me several times, but I have always gone right on as though it was not there, and found it was not much of a disadvantage.

Dr. McClelland: The only couching operation that I ever saw was in Moorefields' years ago. Mr. Treacher Collins was asked to operate upon a patient of Mr. Worth's. Mr. Worth had operated on the other eye and found a fluid vitreous. The eye was promptly lost at the primary incision.

So Mr. Worth asked Mr. Collins to operate on the other eye. He did the couching operation.

DR. SMITH, closing: Dr. Parker speaks about cataract operations without cocain. I recall many years ago the late Dr. McGraw coming in once when I was making a couple of extractions of cataract; he stood and looked at me. This was before the days of cocain. He shook his head, took me aside and said: "Dr. Smith I don't see how you can do it, I don't see how they will submit to it." I said: "Why, doctor, you heard them say they did not feel any pain especially." I was in the habit of using a little trick. With my fixation forceps to steady the eye, I steadied the eye also with one finger pressed against the sclera. At first when the eye was touched there was a movement, but after a moment it became perfectly steady, and many an operation of that kind have I made without local or general anesthesia.

I have made a good many operations with chloroform. I have had my trouble with chloroform from vomiting afterwards, but there is not apt to be as much loss of vitreous from vomiting from chloroform after the old fashioned von Graefe operation, as we might expect with the flap extraction.

With the dislocation downward, it is an easy matter to pass the spoon behind the lens, press the lens against the cornea and lift it with the loop or the spoon — some prefer one, some the other. But when the dislocation is upward and under the upper portion of the wound, what are you going to do? I was called by the late Dr. Goux some years ago to relieve him of just that accident. He had a small wound. In trying to get the lens out, he did not tilt it, but he pressed it directly upward and the result was that it went up and under the upper lip of the incision. It was about two-thirds hidden. When he called me a couple of days after the operation, there was considerable inflammation. I simply opened the wound and pressed the spoon under the lens, reached in and pulled it out.

I have seen loss of vitreous and the lens fall back into the vitreous chamber, in the hands of a number of operators in the Old Country. I recall Liebreich's operation of that kind, the first one I saw him make at St. Thomas' Hospital in London, where he had a large loss of vitreous and fished around for the lens and did not get it, but did get most of the vitreous.

One objection to the old fashioned conjunctival flap; which we have made, gone away from, gone back to again, and then gone away from, is the bleeding which takes place after the conjunctival cut, bleeding into the anterior chamber to such an extent that you cannot see the pupil. You may coax it out, only to have it fill in again.

The bead of vitreous which may appear just before the lens escapes, if the hyaloid is not broken, will many times drop back into position without rupture of the hyaloid if the speculum is lifted. If the hyaloid ruptures, then it is better to remove the speculum and remove the lens before you have pressed it out of its normal position.

Prolapse of the iris, which takes place at the angles of the wound, may not show itself, or, if you have operated by the classical method of flap extraction, you may not find it until you dress your eye three or four days afterwards. Some say, cut it off. I say, no. I say let it remain and heal in the wound. If you cut it off at that time, you are likely to get infection. If you allow it to remain in there, it blocks the wound, it blocks out the microbes so to speak, and it heals in the wound and can be taken care of by a later operation.

The mental condition spoken of by Dr. Connor, we all have met, who have had many operations. The best treatment is to remove the dressing from the fellow eye. In this class, all that I have seen have recovered without any further attacks of insanity.

The first operation I ever saw for cataract was made by couching; I saw quite a number of them. The first three or four operations I ever made for cataract were by couching or depression. There is a difference between

depression and couching. In depression, we press the lens right down in under the vitreous. In couching we put the needle in and press the lens back so that the vitreous comes over it, or press it backwards into the vitreous. In the number of cases that I operated on in my younger days, I never had any bad results. When we used to couch, we pressed the lens down under the vitreous and held it there for a few minutes until the vitreous flowed over it. Then we kept the patient very quiet for a number of days in bed, only to have him get up and see very nicely. That was my experience as a student when my old preceptor used to operate that way.

The wound which Dr. Bentley spoke of seeing Dr. Fox make is the one for cataract suggested by Kuchler, many years ago. He made a transverse incision horizontally across the center of the cornea to extract. Dr. Le Brun, the Frenchman, made his operation, a semicurved linear operation, between the pupillary center of the cornea and the lower portion of the lower periphery of the cornea. Dr. Liebreich made a similar incision between the pupillary border and upper periphery of the cornea, each claiming his own incision, nothing more.

When the keratome is passed in, you can imagine very readily that the outer portion of the wound of the cornea is wider than the inner, and many of us have been in the habit of enlarging that incision when drawing the keratome out, cutting to one side and then to the other with the edge of it, to make the incision the same size on the inside of the cornea.

The subject of accidents in cataract extraction is one which interests us all, and the accident that I had in the case I have reported was a new one to me. A portion of the lens had been removed, and the balance absorbed in the vitreous. It got along so nicely that I thought you all ought to know about it.

Traumatic Aneurysm in Cavernous Sinus.

Dr. Carl McClelland reported the case of Mr. J. M., aged 25, white male laborer, who had swelling of the left eyelid and protrusion of the eyeball. Two weeks before, he was struck in the temporal region on the left side of the head with the sharp end of an ice pick, and pounded over the side of the head with the handle of the pick. He walked three blocks to his home and became unconscious. He was unconscious for 48 hours. The X-ray of the skull showed a punched out hole in the outer table of the skull, where the ice pick had entered; and a linear fracture running back and upward from this point for about an inch and a half. There was no depression over the nose.

Patient regained consciousness a few hours after admittance to the hospital; his temperature and pulse were normal. No paralysis, perfectly clear mentality, no lapse of memory. Temperature and pulse normal. Vision 20/20, negative fundus examination, no swelling of lids or bulging of the eyeball. L. Vision 20/20. Pupil regular and reacts to light and accommodation, eyeball markedly protruded, slightly congested, cornea clear. There was marked chemosis of the conjunctiva, marked swelling and protrusion of both lids, no pulsation.

It was thought at this time that he had an orbital cellulitis. Expectant treatment was used for a few days. The eyeball protruded more and swelling was more intense. Chemosis of the conjunctiva was so intense that it ruptured. Ten days later an attempt was made to drain the orbit. Opening was made along the recti muscles. No pus was found, but there was a large amount of dark blood. Cigarette drains were inserted. This, however, did not give the patient much relief. The vision decreased to practically nil. It was decided to enucleate the eyeball. This was done four days later. There was an unusual amount of bleeding, which we considered should be expected on account of the intense swelling and the inflammation of the tissues. Twice the patient had considerable hemorrhage of the conjunctiva, before the eye was enucleated. Hemorrhage was of sufficient quantity to call the interne,

and it required considerable pressure to stop it. Patient left the hospital in about three weeks. Socket had completely healed. There was great thickening and swelling of both the upper lids and the lower, but no pulsation.

About one week after leaving the hospital, patient came into the office and told me that a few days before he had noticed a beating of the upper lid. Examination showed a characteristic bruit and pulsation of an aneurysm. Pulsation could be felt over the upper lid and the upper part of the socket. Bruit could be heard all around the orbit, but more marked on the frontal and nasal aspect. Dr. W. R. Parker was called in consultation at this time and agreed with me that we were probably dealing with an aneurysm of the cavernous sinus. It was found that pressure upon the common carotid artery with the finger stopped the pulsation and bruit. In September it was decided that the common carotid artery should be ligated; this was done under novocain anesthesia and the pulsation and bruit stopped immediately. Swelling of the lids gradually disappeared under the use of the pressure bandage. Patient is still unable to wear an artificial eye on account of the thickness of the lids. The lower lid is extremely weak and flabby.

Orbital Fracture, Optic Atrophy, Ptosis and Enophthalmos.

Dr. G. M. Waldeck reported: Oct. 1, 1921, patient fell forward on a metal rod, which struck the left eye, perforating the lower lid, denuding the eyeball of conjunctiva on the lower temporal side and above, causing marked ecchymosis and swelling. Patient was sent to the hospital, the upper lid elevated under general anesthesia. Cornea abraded superficially on temporal side from 2 to 5 o'clock. Conjunctiva stripped from eyeball from 5 o'clock upward into fornix. Also lid split at middle, lid margins gaping one cm. No perforating injury of eyeball.

Conjunctiva was sutured into place with seven silk sutures. . Also lid sutured. The man made a good recovery in as far as the lid and conjunctival injuries were concerned. However, a ptosis of the upper lid was present, as well as a partial paralysis of the superior and inferior recti muscles. There was a moderate degree of enophthalmos, a thin corneal scar and the optic nerve became pale.

An X-ray was taken of the orbit by Dr. P. M. Hickey, who reported: "On the left side, in the posterior portion of the orbit, near the entrance of the optic nerve, we find a distinct change in the appearance of the foramen. The foramen is thickened at its upper and temporal side. There also appears to be some evidence of extra density of the roof of the orbit, back on the nasal side." A fracture involved the optic foramen, in the cicatrix of which, the optic nerve, as well as some branches of the third cranial nerve had become involved. An operation was deemed inadvisable.

There has been some improvement in the ptosis, so that now he is able to hold the eye fairly well open. He has, however, a complete optic atrophy and the vision is nil.

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(*Continued from p. 843*)

Light Sense, Practical Significance of its Variation.

Archibald Stanley Percival, M. B., Newcastle-on-Tyne, England, being absent, his paper was presented by Dr. A. Duane, of New York.

Light sense is the faculty of recognizing different luminous intensities. Too little attention has been paid to the sensibility of the eye to variations in the light stimulus, altho this may be of extreme importance in certain services. A man may have a visual acuity of 6/6, and yet unless we examine his light sense, we may miss the fact that he is night blind. Of what use is such a man, when on watch at sea, in detecting a derelict or

an iceberg, in the ship's course at night?

At nightfall, red colors become much darker, a red geranium will appear quite black, altho yellow and blue flowers can still be seen. Finally as the darkness deepens, blue disappears, and one becomes totally color blind. This successive disappearance of colors is called Purkinje's phenomenon.

When this scotopia is reached, one can still dimly see objects by their differing depths of greyness, but it will be found that one sees best by looking a little to one side of them. Arago first called attention of astronomers to this point telling them that they could best get a glimpse of a very faint star by looking a few degrees away from it. It will be found in complete scotopia the fovea is a blind spot, i. e., there is a central scotoma in the rod free area of the retina.

The visual acuity or form sense diminishes rapidly from the fovea towards the periphery. Acuity of 6/6, at 5 degrees distance becomes 6/24, at 10 degrees, 4/60, and so on. In a very dim illumination, light sense is absent at the fovea, and is at a maximum about 10 degrees from the fovea. One is therefore led to think that rods, or something associated with rods, must be the percipient elements for light sense.

Nocturnal animals possess an excessive number of rods, which are especially long, and a very ill developed fovea, whereas diurnal animals have a well developed fovea and a far greater number of cones. Diurnal lizards possess only cones, while the nocturnal lizards have only rods.

When we pass from bright sunlight to a very dimly lighted room, we can see nothing until our eyes have become scotopic, or adapted to the dark. In order to obtain full dark room adaptation, it is necessary to remain in an absolutely dark room for three-quarters of an hour or so, and then some very curious phenomena are found. In scotopia the light sense is about twice as great with both eyes as with only one. If an object be illuminated by a dim composite light, the retinal sensibility is proportional to the square root of the areas stimulated. In light adapted eyes there is no such binocular summation of stimuli, nor, if the retinal areas stimulated exceeds 1′, is there any increase of brightness from stimulating a larger area.

If you try putting up a fine wire, 16 feet long, horizontally against the sky, you will see it quite easily at a considerable distance, but if you block out from your view all but a foot of it, you will not see it at all, as its effect on your retinal sensibility is only one-fourth of what it was, thus showing that as it obeys the square root areas law, it must be a light sense not a form sense test. Most of our socalled form sense tests are really composite tests of our light sense also, as, for instance, especially the common dot tests and even Landolt's excellent broken ring tests.

Now visual purple or rhodopsin occurs in the rods only, and there is good evidence to show that rhodopsin plays a very important part in the physiology of light sense. When a spectrum of very low intensity is viewed in the dark by a scotopic eye, it appears as a colorless gray streak, the brightest part of which is in the green.

Light sense is tested in two different ways: (1) The discovery of the smallest quantity of light that can be recognized on a black background. This is called the *light minimum* test, and is always referred to as L. M.; and (2) the smallest difference of illumination that can be appreciated between two sources of nearly equal luminosity. This is called the *light difference* test, and is always denoted by L. D.

Now the important practical point is, that the sense for L. M. is always most affected if the receptive part of the retina is most implicated, i. e., in affections of the bacillary layer, the visual purple, and the choroid, on which the efficiency of the visual purple depends, whereas the sense for L. D. fails if the *conductive* part of the visual function is primarily at fault. For instance, in optic neuritis and in retrobulbar neuritis L. D. is at fault. L. D. fails also when the nerve fibrils in the retina are chiefly affected. This I have only recently found out. In all previous publications that I have seen on the subject, it has been

stated that defective light difference was diagnostic of a lesion in the optic nerve. This hasty assumption was no doubt due to the very troublesome apparatus that was used for testing light sense. With my simple little rotating discs, the whole examination need not take longer than three minutes, and so more experience of the diagnostic value of light sense phenomena can be gained in a week's hospital practice than could be formerly attained in a year, unless one's whole time were devoted to the subject.

Dr. Traquair, to whom I pointed out my difficulty, suggested the association of L. D. defects with lesions of the conducting apparatus, instead of simply confining them to those of the optic nerve. I have verified this suggestion by finding L. D. defects in several cases of retinitis. I now think that if the superficial layers of the retina are affected, a L. D. defect will be found, but if the deeper layer (of the rods and cones) or if the choroid be at fault, there will be a L. M. defect.

In all the cases of early glaucoma that I have examined in this way, I have found a L. M. defect as the earliest symptom, and that it was afterward followed by a L. D. defect. I suggested as an explanation of this, that the bacillary layer is more sensitive to slight pressure than the nerve fibers. My observations need confirmation, and I would be exceedingly grateful to any of you if you can confirm or refute them. It is most important to obtain a really reliable indication of the first onset of chronic glaucoma, and I believe that the light sense test will be found to be far more trustworthy than any single tonometric reading.

In cases of early cataract or hazy media, when no details of the fundus can be seen with the ophthalmoscope, it is often of extreme importance to obtain some indications of the condition of the structures at the back of the eye. An examination of the light sense of the patient helps us out of the difficulty.

Two months ago I was consulted by a new patient, for cataract, who told me that now she was quite sure that her right eye was ready for operation, but on testing her light sense I found that both L. M. and L. D. perception were very defective, especially her L. M. I concluded that there was probably a macular hemorrhage present, as projection was fairly good. The light sense test saved a disastrous operation.

We know that unlike form sense, light sense is fairly good even to the periphery of the field, and this peripheral or rod vision is of far more importance than most people think. All must have noticed how very readily one notices a movement of any object in the peripheral field, and so the eyes are turned in that direction to see clearly with the macula what it is. Indeed, as the projection from the periphery is so good, it is often unnecessary to turn one's eyes toward the object. In a town one avoids bumping up against passers-by not by macular vision, but by peripheral or rod vision, i. e., by light sense, not by form sense. Without good light sense, one will not see what to look at. The British Board of Trade ordains that seamen should pass a very high standard of tests for macular visual acuity, but pays little regard to light sense. Quickness of sight —to see an iceberg in twilight for instance—is what is wanted, not ability to determine details about its shape that subtend angles of one minute.

Light sense is the most primitive of the visual functions, and is therefore the last to be lost in ordinary cases of amblyopia. At any rate, in children with an amblyopic squinting eye, in which the form sense may be diminished to 6/36 or even less, light sense will usually be found very good, often better than in the normal eye; however, in later life this extraordinary light perception seems to be lost.

Light Sense Test

Percival's test can be made in ordinary daylight by rotating the celluloid discs on any convenient motor, or by spinning them on an ordinary needle.

L. M. Discs: There are two black discs, on each of which are three white sectors of different sizes: when one of these discs is rotated, three lighter rings are seen, of which the inner is the lightest. On the disc with the large sectors, the inner ring denotes a L. M. of 1/12.5; the intermediate ring, 1/25; the outer,

1/50. This it is more convenient to denote by 12.5, 25, and 50, as ability to see the outer ring denotes a better light minimum sense than that which can only see the inner ring. Similarly, the disc with the smaller sectors denotes L. M. of values 50, 100, and 200.

L. D. Discs: These are white discs, with black sectors of correspondingly different sizes, and when rotated indicate the light difference sense for values of 12.5, 25, 50 and 50, 100, and 200.

It will be noticed that a light sense of either kind, of value 50, is given twice; this is often useful in forming an opinion of the reliabilty of the statements of the patient.

It will be found that few can distinguish the faint grey ring that corresponds to L. D. = 200, and so I assume that the standard for L. D. is 100, while that for L. M. is 200.

It might be hastily assumed that the size of the black sector denoting L. D. = 100 should be of angular aperture 360/100 degrees or 3° 36′, but as Abney has shown us that 5% of the incident light is reflected from lampblack, we must add 1/19 to the angle, so that this sector must be 3° 47′ 22″; similar additions have been given to the other sectors.

Contributions to Ophthalmology.

C. E. Ferree and G. Rand, Bryn Mawr, Pa., discussed the following topics:

I. *An Illuminated Perimeter with Campimeter Features.* This instrument was devised in response to a request by the American Ophthalmological Society for a feasible means of illuminating the perimeter arm with a light of good intensity and quality, so that every point on the arm, in any meridian in which it may be placed, shall receive equal intensities of light. Other special features of the instrument are a carefully standardized control of brightness of preexposure and surrounding field; a provision for an accurate control of fixation both for the normal eye and eyes having a central scotoma; a device for mapping central scotomata; a tangent screen for mapping the blind spot and paracentral and peripheral scotomata, which can be readily attached and removed from the stimulus carriage; devices for the control of fixation in high myopia and presbyopia and a provision for taking the field, if desired, with the eye corected for errors in refraction, etc.

II. *Variable Factors Which Influence the Color Fields.* These are the wave length and purity of the stimulus, the intensity of the stimulus and the visual angle, length of exposure of the eye, the method of exposure (moving or stationary stimulus), accuracy and steadiness of fixation, the intensity of the general illumination of the retina and its state of adaptation, breadth of pupil, and the brightness of the preexposure and surrounding field. The most important of these, from the standpoint of the work of the office and clinic, are the intensity of the stimulus, the brightness of the preexposure and surrounding field, the intensity of the general illumination, and the accuracy and steadiness of fixation.

III. *The Acuity Lantern.* This apparatus, devised in response to a request by the Eye Division of the U. S. Naval Hospital, for a means of making a quick and accurate test of acuity at low illuminations, has been elaborated to serve the following purposes in office and clinic work: (a) for testing acuity with a means of varying, controlling and specifying the amounts of light used over a wide range of intensity; (b) for determining the exact amount and location of an astigmatism with great delicacy and precision, and for using at will either illumination or the visual angle scale for the detection of errors in refraction or for their correction; (c) for testing the light and color sense in terms of the amount of light required just to arouse the light and color sensations; and (d) for varying independently the saturation and brightness of a color, and for color mixing. The use of the illumination scale for the detection of errors in refraction or in their correction was discussed, and a comparison is made of the sensitivity of the illumination and the visual angle scales.

IV. *Effect of Varying Intensity and Composition of Light on Acuity,* speed of discrimination, speed of accommodation and other important ocular functions. The purpose of this study is to broaden our understanding of clear see-

ing and the factors upon which it depends, and to enlarge our knowledge of the principles and possibilities of functional testing in relation to diagnosis and other important application.

V. *Illumination of Test Charts.* The question of the most favorable intensity of illumination is discussed in relation to the three important applications of acuity testing; diagnosis, vocational selection, and hygiene or welfare work on the eye.

Diagnosis of Errors of Refraction by Stenopaic Slit and Clock Dial.

Dr. Emile Junes, Sfax, Tunis. When one puts in the trial frame a stenopaic slit and looks at the clock dial at 5 meters, it is seen only by the rays passing in the one meridian. If these rays have their focus on the retina (emmetropic refraction), all the lines of the dial are seen with the same clearness. But if the focus falls before or behind the retina (ametropic refraction), the appearance of the dial changes, and the eye distinguishes clearly only in one diameter (or group of two or three diameters immediately adjoining), that which is located in the direction of the meridian exposed; while the others offer an appearance more or less confused. The application of this allows us very simply to measure the error of refraction.

The technic of the method was explained in detail: 1. When the patient sees clearly all the lines on the clock dial. 2. Where only one line or group of lines are seen clearly. 3. Where none of the lines are seen clearly.

Advantages of the method are: It calls for no new apparatus. Rather it simplifies the existing tools, because of the simplicity and clearness of the optic phenomena which characterize it. It is susceptible of universal use, and permits the rapid diagnosis and exact measurement of ametropia, whatever be the state of refraction, the intelligence, the degree of learning, and the nationality of the subject and examiner. Its superiority shines forth especially with regard to astigmatism. It can render the greatest services in all cases where the objective method is practically impossible; for example, in the army, the country, etc.

Anomalies of Ocular Development and Pigmentation.

Dr. J. Gray Clegg, Manchester, England, reported: Case I. Bilateral symmetric congenital *corectopia* with *iridodonesis* and *microcoria, microlentis* and *coloboma lentis.*

The patient, a male, aged fifty-eight, always had poor sight. Worked as stoker and engine tender. Could not see enough to gain much at school. One half-brother and two half-sisters, all by one mother. All have good sight except the brother, who is shortsighted and wears glasses. No other member of family had eye trouble except one with squint. Patient has five daughters and one son. All have normal eyes.

Sight got better as he grew older until forty-six or so, but since then worse. Could just read newspaper with the left eye by holding near face and screwing eyelids up. Could only see headings of newspaper with the right. Never could obtain glasses to help. Came under my care about June, 1921, because he frequently ran against people in the street.

Cornea clear, but a trifle smaller than normal. Diameter, 10 mm. vertically by 11 mm. horizontally. Anterior chambers rather deep. Plane of irides flat and coronal. The tissue of the iris thin, but thickened in immediate neighborhood of the pupils. Pupils reacted definitely to light. Drugs had no marked effect on the pupils, except that atropin alone brought about some dilatation, increasing the pupillary area to double its ordinary size.

It was impossible to see thru the pupils with the ophthalmoscope, but they lighted up well by transillumination, showing as small, irregular sided slits, the pupillary margins of the iris roughly dovetailing their prominence and fissures when contracting.

With a strong loupe, the stretched iris tissue appears as irregular alternating bands of blue and brown, but the tissue surrounding the pupil is finely radially furrowed, and of a light brown tint.

V. R. E. + 3 D. sph. = J. 20; V. L. E., 6/60; with + 3 D. sph. = J. 20. Iridectomy inner side gave a good hole in the iris, somewhat square in shape. A week later the lens appeared in the anterior chamber, completely opaque, cal-

careous, with small coloboma below. Next day, the lens slipped back into the vitreous cavity; could not be seen by the ophthalmoscope. A day, the lens again in the anterior chamber. Patient kept on right side. Lens 5 mm. in diameter with coloboma below. Under a local anesthetic, a section of the cornea was made up and out. Lens spooned out. In the process the capsule was ruptured partially. Whole drawn out by forceps; atropin instilled. A week later, some swelling of lids, slight injection, chemosis of the conjunctiva. Keratitis striata. Fair anterior chamber. Coloboma larger than before extraction of lens.

A month after operation: Right palpebral fissure smaller than left. Slight redness of skin of lids. Merest trace of limbal injection. Wound perfectly healed. Cornea bright. Fair anterior chamber. The new pupil is absolutely black. The original pupil is almost closed by sphincter and shows as black, irregular line only. V. R. E. + 9 D. sph. ⌒ + 2 D. cyl. ax. 15° = 6/36; + 16 D. sph. ⌒ + 2. D. cyl. 15° = J. 8. Vitreous clear. Disc is somewhat blurred at margin. Staphyloma posterior at disc, 1/2 diameter in width. Superior temporal retinal veins tortuous. No other fundal lesion. The left field shows slight contraction, but the right is normal. There is no scotoma. Tension normal.

Case II. *Melanosis* of the eye, skin of right side of head, and right palate. E. M. R., female, aged twelve. One sister aged ten; one sister aged seven, all healthy. One half-brother, seven months, quite well. No history of any abnormal pigmentation in two maternal uncles, eight maternal aunts, three paternal uncles, two paternal aunts. Has numerous cousins, all well. Patient had slight scarlet fever and varicella.

There is an extensive patch of pigmentation of the skin of the right side of the head, affecting the upper part of the cheek, the temple, and the skin of the scalp, reaching nearly to the vertex. The density of the pigmentation is not uniform, and it resembles the color of a blue black ink splash. The edges of the area are irregular and not sharply defined. The skin is not swollen and does not fade on pressure. There is no nevoid condition.

A similar pigmentation is found on the right palate, with indistinct margins, and a less deeply pigmented area is seen in the mucous membrane of the right cheek. The patch on side of cheek and temple fades a little when weather is fine, and gets darker when wet. The pigmentation was present at birth and has not changed. No other abnormal pigmentation is discernible.

The right globe presents the most striking feature of the case. It is somewhat enlarged, and divergent to the extent of some 15 degrees. The palpebral fissure is a trifle wider than the left, exposing the sclera below for about 1 mm. The conjunctiva itself is not affected. The ocular portion is free from any abnormal adhesions to the episcleral tissue. The latter presents extensive areas of brown black pigmentation. Two of the better defined areas are distinctly swollen to the extent of 1 mm., viz., the large one below the cornea and a smaller one above. The cornea shows in a small central area fine superficial pitting, but it is otherwise clear. The anterior chamber is rather shallow. The surface of the iris is a stippled dark brown, as seen in the brown eyes of dark races. There are two areas of brownish, gelatinous material, apparently lying on it, both of which extend slightly over the pupillary margin. The anterior capsule and cortex are clear. Some bluish opacity in the nucleus of the lens is easily seen. No red reflection is obtained by the ophthalmoscope. V. R. E. No. 1. p. No lighting of pupil by transillumination. T + 1.

The left eye is normal in every respect and its field good. The thyroid is large; some thrill felt on pressure on gland. Impairment of resonance with some collapse of the lung at the right apex, but no evidence of active disease. There is a deep seated mass in the right hypochrondrium, which is moderately tender on pressure (glands?). Vascular and nervous system normal.

Mercurials and Salvarsan for Eczematous Conjunctivitis and Keratitis.

Dr. Antonio Torres Estrada, Mexico City, pointed out that eczematous,

strumous or impetiginous conjunctivitis takes on at times a grave character, on account of the lesions caused to the cornea. Its etiology is at present unknown. But among the causes that are productive of such trouble have been noted:

A. Constitutional causes, scrofula, bad feeding, bad hygiene.

B. Toxic, gastric or intestinal autointoxication.

C. Infections, action of tuberculous toxins from some distant focus.

D. Parasites. Phthiriasis, oxyurides.

E. Neurotrophic.

The author brings out the frequency of syphilis in patients that have these forms of conjunctivitis, a fact that has been rarely mentioned; also their association with syphilitic conditions, such as interstitial keratitis, scleritis and iridocyclitis. The classic treatment based on collyria with mercurials (calomel, yellow oxid of mercury) is insufficient in severe cases. The hygienic measures, which constitute the general treatment, are as insufficient as the local treatment. There does not exist at the present time a general treatment that is specific and active.

Mercury introduced into the organism has a decidedly favorable action on the disease. This, and a marked frequency of coexisting syphilis, suggested the testing of other antisyphilitic remedies. He found that the derivatives of salvarsan were superior to the action of mercury. The author offers the hypothesis that in many cases the cause may be syphilis. But at present he does not think there is sufficient evidence to prove this, especially since there exist such important facts in favor of the tuberculosis theory. He reported three cases.

Instillation of Novarsenobillon for Resistant Syphilitic Interstitial Keratitis.

Dr. Arnold Renshaw, Manchester, England, being absent, Dr. J. Gray Clegg of the same city presented his paper.

In any extensive series of cases of luetic interstitial keratitis, one comes across a number which are very resistant to ordinary mercurial treatment. At the Royal Eye Hospital in Manchester, these cases, and in fact most of the ordinary type, are submitted to treatment by means of salvarsan or its derivatives, novarsenobillon, neosalvarsan or neokharsivan. One is able to distinguish three types:

(1) Which rapidly improves under combined mercurial and arsenical treatment.

(2) Rapidly improves but subsequently relapses under this treatment.

(3) Even after prolonged administration of mercury, iodides and salvarsan derivatives fail to improve in so far as the infiltration of the cornea is concerned. Having noted that a definite ground glass or hazy appearance of the cornea persisted even after twelve to fifteen injections of novarsenobillon or neokharsivan, it occurred to me that the direct instillation of concentrated solutions of the novarsenobillon might be of use. A 1% solution of N. A. B. in distilled water was prepared, and instilled into the conjunctival sacs of the eyes of rabbits. The results were examined by Dr. Clegg and myself, and he decided that there appeared to be nothing to contraindicate its use in children. Accordingly a number of patients were submitted to me by him for this method of local treatment.

Subsequently, other members of the honorary staff of the Manchester Royal Eye Hospital sent along cases for similar applications. All the above mentioned types have been dealt with—namely, the early type, the relapsing type and the resistant type. In the two former types, general antisyphilitic treatment was in its earlier stage, and it is difficult to appraise in a scientific manner the exact value of the local treatment with regard to the improvement found.

Its effect was more to be noticed therefore in the resistant type, which had been treated so thoroughly with mercury, iodides and salvarsan derivatives, that one became almost hopeless of any further good resulting. Instillations have been continued over a period of months from the cessation of general treatment by salvarsan derivatives.

Method. A few drops of 1% solution of novarsenobillon derivatives in distilled water were dropped into the eyes, usually at intervals of seven days, but in the

later stage the interval has been 14 days. The total number of cases treated was 20.

The immediate effect of instillation is a slight hyperemia at the corneal limbus. The patients usually complain only of slight irritation, but the lacrimal secretion is increased temporarily.

The patient is recumbent during the application, and is told to roll the eyeball about so as to get a uniform concentration of the drug, and the drops are added slowly, preferably until the dilatation of the circumcorneal vessels is well marked. The effects consist chiefly of some slight alleviation of the photophobia in the earlier cases, manifest after two or three weeks. Secondly, in the more resistant cases in which intravenous injections have been abandoned, the corneal haze gradually disappears and the substantia propria becomes comparatively clear. The cornea resumes its transparency first at the periphery, and usually the upper part of the cornea clears before the lower part. The disappearance of the corneal infiltration is of course associated with much improved vision, and one patient under this form of treatment can now thread with ease a very fine needle, whereas previously she could scarcely detect hand movements. The effect in all cases has been to reduce the degree of corneal infiltration; and in relapsing cases to subdue the local inflammation.

Ill Effects. So far as can be ascertained no ill effects are produced. In one case only, a very difficult one, which had resisted all forms of treatment, a slight corneal ulcer formed and perforation occurred, but this might have happened quite apart from this form of treatment, and the patient made a good recovery, the cornea eventually clearing very well except for a small scar of the ulcer at the perforation site.

Conclusion. In conclusion, this method is, I believe, a very valuable adjunct to the usual treatment; further this method can be continued when further intravenous injections become dangerous.

It should, however, be used only as an adjunct to general systematic treatment of the disease.

It is interesting to speculate as to whether spirochetae are actually present in the cornea, and if so whether their persistence is due to the lack of blood supply to this tissue.

I wish to express my indebtedness to the courtesy of Dr. Clegg, who has specially asisted in this investigation, and to the other members of the honorary staff, who have also submitted their cases for this treatment.

Treatment of Infectious Keratitis by Vaccines.

Dr. Rovirosa Virgilli, Madrid, Spain, reported further experiences with the methods of treatment, to which attention was called in his earlier communication, in 1915. He sets forth results of practical importance secured in the treatment of ocular disease with vaccines, and especially the *staphylococcus vaccine* in suppurative keratitis. The results obtained in this class of ulcers are truly notable. In all the cases of keratitis so treated, there were observed rapid cicatrization, absence of scarring, and preservation of function in the greater part of the cases.

The vaccines deserve to occupy the first place in the treatment of ulcerative keratitis. All cases here reported were presented to the students of the faculty of San Carlos by Dr. Mayoral, Professor of Medicine. Preference is given to the polyvalent stock vaccines as more immediately available, convenient and less expensive. In case they are ineffective, autovaccines may be used as soon as they can be prepared. When in place of serums we employ vaccines, toxins are injected that compel a reaction on the part of the organism, that produces antibodies which destroy the germs and neutralize their toxins. The treatment is compatible with other measures, local or general, that experience has sanctioned. They rally the cooperation of the whole organism to the process of local cure.

The first cases cited were cases of panophthalmitis, in which enucleation had been advised, but under vaccine treatment retained their eyeballs. Two were staphylococcus infections, and the third presented a diphtheroid bacillus.

A fourth case presented corneal ulcers which healed promptly, with little scarring and good vision. The organism was a pyogenic staphylococcus. In serpent ulcer, there was an excellent result from pneumococcic vaccine, but there had occurred perforation of the cornea. Among the cases of marginal blepharitis, all were benefited, mostly by staphylococcus vaccine, but in one case by an autovaccine containing streptococcus.

Nineteen cases were reported in brief outline, all progressing favorably to good results. There were also thirteen cases of suppurating ulcer of the cornea given in similar outline, that seem to show marked benefit. These included some due to Petit's diplobacillus. The practical applications of immunity and the combination of factors that produce it were discussed.

Carcinoma of the Choroid.

ALLEN GREENWOOD, Boston. Metastatic carcinoma of the choroid is such an infrequent manifestation of a general carcinosis, that the chance to see and forlow more than one case but rarely falls to the lot of an ophthalmologist. The opportunity which has come to the author to follow four cases makes it seem worth while to publish them.

CASE 1, first came to the hospital on account of acute glaucoma in the left eye. The fundus showed a separation of the retina in the upper temporal quadrant covering a flat, grayish white mass. A diagnosis was made of sarcoma of the choroid, but the eye was not removed as it was suspected that other organs were involved, particularly the liver. The ocular pain was easily controlled by cocain and miotics. The autopsy findings indicate the prostate as the original source of the general carcinosis. The organs particularly involved in the general disease were the lungs, pleura, peribronchial lymph glands, the liver, the brain and the eye. The eye condition was the first to call attention to the possibility of disease in other parts of the body.

CASE 2. Miss. J. D., age 48, cook. Came under observation April 12, 1908, with the history that the sight in the left eye had been dim for several months, and lately had grown very much worse. Right eye, vision = 20/20 and fundus normal. Left eye had vision of hand motions only in outer field. Fundus showed a retinal separation in the outer part, extending up to the disc and including most of the upper and lower parts as well. Thru the separated retina, 3 d.d. temporally from the disc, could be seen a white mass, elevated centrally about 3 D., which gradually flattened out in all directions. The tumor was quite white in the most elevated portion, giving the appearance as tho a disc of some substance like cheese had been inserted under the retina.

Immediately the similarity of the fundus picture to that seen in case one came to mind, and questioning the patient brought out the history that for a year there had been a hard lump in the left breast, and she had become very short of breath. She had seen no physician, so was sent to one, who reported cancer of left breast, involving left lung and the axillary glands; therefore, inoperable. A weak solution of pilocarpin was ordered for use daily.

The patient was seen again August 4, 1908, complaining that the right eye had a spot of dimness. Right eye examination showed up and out from the disc a whitish, flat mass, about 2 d.d. in size, with retina over it elevated 1 D. This tumor beneath the retina corresponded in all but size to the one seen in the left eye in April. The left eye showed at this time complete retinal separation and opaque striæ in lens. Tension was normal in both eyes. I next saw the patient in consultation at the Waltham Hospital in October, 1908, she having been taken there on account of her weakened general and mental condition. I found her semiconscious and incoherent. The tumor mass in the right eye had increased to more than double its former size, and was elevated at its highest point 4 D. and extended to the disc.

The left eye showed a retinal separation up against a cloudy lens. The patient died several weeks later from cerebral involvement.

CASE 3. Mrs. J. S., age 60. Seen September 12, 1912, at her home, as she was too feeble to come to the office. Patient gave a history of vision failing for several months, beginning first in the

left eye and shortly after in the right. Two years before, had been thru an amputation of the right breast and dissection of the axilla for carcinoma. Had been losing strength, and had a harsh, dry cough with much shortness of breath.

Examination showed, right eye, a flat retinal separation out and down. Retina elevated 3 D. about 4 d.d. down and out from disc, with the elevation growing less as one looked toward the disc, or peripherally. A white discoid tumor mass could be seen thru the overlying retina, but no independent vessels were to be seen and no inflammatory reaction present. Left eye fundus showed extensive separation of the retina from the disc outward, and extending somewhat to the nasal side above and below the disc. The lower part of the separation was billowed forward by exudate. Up and out there could be seen, thru the overlying retina, a grayish white mass somewhat uneven, the highest elevation being about 4 D. This mass extended from the temporal side of the disc, where it was very thin, outward beyond the equator. There was no independent vessel formation on the mass. The pupils were fairly large, but tension not above normal. The daily use of pilocarpin was advised with the hope of preventing hypertension and pain. The patient died three months later, with evidences of cerebral involvement and practically blind, but without the eyes becoming painful.

Case 4. Mrs. A. R. H., age 36. Seen November 7, 1921, complaining that something seems to come frequently before the right eye, so that print blurs and there is a constant tendency to rub something from the right eye. Vision O. U. = 20/30. Patient is slightly myopic. Examination of fundus, right eye, revealed a flat, discoid subretinal mass, located down and out from the macula. It was found 3 d.d. in size, and the upper inner edge reached to the lower border of the macula. It was quite white, with the center whiter than toward the periphery. No independent vessel formation was seen, and no measurable elevation of the retina. No evidence of inflammatory reaction to its presence. The visual field showed a partial scotoma up and in. A more extensive examination of the field was not attempted at this time, on account of the patient's poor physical condition. From these appearances, a diagnosis of carcinoma of the choroid was made, and then the history was obtained of two operations for mammary carcinoma. A few days later, an X-ray examination at the hospital showed extensive involvement of the left lung.

Remarks

In all four cases, either an autopsy, an X-ray or physical signs showed involvement of the lungs. With the lungs involved, it is easy to understand how cancer emboli can be taken up by the pulmonary vein, carried to the heart and thence thru the arteries to the meninges, choroid and other parts of the uveal tract. The lungs become involved either by direct extension, as from a mammary carcinoma, or thru the lymphatics and the pulmonary arteries. The presence of cancer emboli in the aterial circulation is well illustrated by the case of Ishihara, who described a primary mammary carcinoma with multiple carcinomatous emboli in the choroidal capillaries. There were three isolated tumor nodules in the choroid, and eleven distinct capillary emboli composed of carcinoma cells. In one of Dr. Weeks' cases, an eye with a choroidal tumor was removed and the growth found to be carcinomatous, with the primary source in the lungs only discovered at autopsy. A great many of the causes so thoroly tabulated by Suker and Grosvenor showed an involvement of lungs, when the rocords indicated a thoro general postmortem examination.

The author queries as to how often, if ever, a choroidal carcinoma occurs until after some involvement of the lungs. The discovery, therefore, of a whitish discoid subretinal tumor with moderate or little elevation of the retina, no independent vascular system, and no surrounding inflammatory reaction of the retina, should lead to a careful examination of the lungs, especially by the use of the X-ray.

In the author's first case, the tumor was diagnosed as a sarcoma. This has frequently been the case, and, if the pa-

tient is first seen after the onset of pain and hypertension, is to be expected. Hypertension is not the rule as in sarcoma, even when the eye is extensively involved. In his last three cases, including five years, hypertension was not present. How much the daily use of a miotic may have to do with preventing this painful complication can only be conjectured. In case 1, pain and hypertension were made to disappear by the use of cocain and miotics, sufficiently to prevent any necessity of enucleation. Pain and hypertension are the only complications which, if unrelieved by treatment, call for an enucleation of the eye, unless one is in doubt as to the differential diagnosis between metastatic carcinoma and sarcoma, and, in such a case, the removal should only be advised after an exhaustive physical and X-ray examination has proven negative as to carcinoma. It is possible that the more extensive pushing forward of the vitreous due to the greater projection of sarcomata tends to increase the liability to hypertension, while the flat carcinoma masses, even when extensive, do not encroach so much or so rapidly on the vitreous space and thus lessen the liability.

It is not possible to arouse as much interest in such an absolutely hopeless condition, but one should be on the lookout for these cases, particularly as they seem to be on the increase. Finding an eye, therefore, that presents a discoid white, or greyish white subretinal mass, located temporally not far from the macula, with the overlying retina only elevated 2 or 3 D, at the most, and no evidence of inflammatory reaction, or independent vascular system, particularly in women, be suspicious of metastatic carcinoma, remembering that such tumors rarely need enucleation.

In spite of an attempted differential diagnosis, cases will occur where an eye will be enucleated for sarcoma when the tumor is a metastatic carcinoma. In the author's first case, this would have occurred but for the evidences of an enlargement of the liver. It is doubtful if the reverse is ever found, viz., that a tumor, having been diagnosed as carcinoma, (after careful study), later turns out to have been sarcoma. This fact should be borne in mind when making a differential diagnosis. Therefore, when a tumor, having all the characteristics described above as being indicative of carcinoma, is so diagnosed and later the patient succumbs to what is very evidently a general carcinosis, especially if with evident lung and brain involvement, it may safely be considered that the correctness of a diagnosis of metastatic carcinoma of the choroid has been established, even if a microscopic study of the eye be not made or a general postmortem be conducted.

Metastatic Thyroid Tumor in the Orbit

Dr. Arnold Knapp, New York City, stated: Cohnheim was the first to recognize that goitre may cause metastases, and called them metastatic benign strumas. These metastases occur in the bones and in the lungs. Why they seem to select the bones is unsettled. A. Müller believes that the medulla of the bones furnishes a favorable site for their growth because of its retarded circulation. Thyroid gland cells after entering the circulation can remain viable, and in certain places proliferate and form tumors. Trauma plays here a definite role. The destructive power of these metastases is particularly evident in the bones. This destructive tendency, the formation of metastases, and recurrences, cause some authors to regard them as essentially malignant. The thyroid in some of these cases seemed perfectly normal. The tumor, may, of course, be overlooked in the thyroid gland.

Schmidt collected 49 cases of struma metastases. With metastasis, careful search reveals a carcinomatous part in the normal thyroid gland tissue. The site of these metastatic thyroid gland tumors is in various bones, particularly the cranial bones. 29 metastases occurred in the skull, principally in the frontal and parietal bones; in the vertabræ, 16; in the ribs and shoulders, 4; in the pelvis, 11; in the femur, 7; in the humerus, 6. The size varies from that of a fist to an egg. The age of the patient is between 30 and 60. It affects women more frequently than men. Trauma was elicited in 11. From the

standpoint of the histology of the tumor and the clinical course, the struma metastases were malignant in 39; uncertain in 5; possibly benign in 5.

CASE REPORT. E. R. B., age 66, Dec. 18, 1917: Has always been in good health until recently. Has complained of vertigo, and comes on account of discomfort in reading. Vision with glasses 20/20. Both eyes seem unduly prominent. The right upper lid droops, and the right eye is distinctly more prominent than the left. Exophthalmometer R. 32; L. 28. The motility of the right upward is restricted, particularly in abduction (superior rectus). Distinct vertical diplopia, increasing upward and to the right. This diplopia the patient has observed for one week. On palpating the right upper orbital margin, there is a resistance to be felt, especially in the region of the pulley, which consists of a soft mass within the upper margin of the orbit, occupying a round defect in the bone, where pulsation can be felt. The pulley is displaced. Optic nerve normal. Field normal. The blood count is normal; hemoglobin 90%. The Wassermann test is negative.

The Roentgen examination shows an area of increased radiability on the right side, indicating an area of softening. It involves the orbital plate of the frontal and extends above the superciliary ridge. It is about three-quarters of an inch in its widest diameter. It extends about one inch above the supraorbital ridge and along the orbital plate to the sphenoidal fissures. There seems to be no involvement of the frontal sinus, but there is a supraorbital extension of the ethmoid cells, which seems to be very near indeed to this area of softening. With the exception mentioned, we find no indication of disease of any of the accessory nasal sinuses. The skull is unusually thick, especially the outer table of the frontal bone.

Increasing doses of potassium iodid were prescribed for six weeks, without any change in the tumor. An operation was advised

Feb. 19th, '18. *Operation.* Curved incision below the eyebrow down to the periosteum, which was found continuous downward with a mass. Incision made thru the periosteum, and the attempt was made to elevate it. It was so firmly adherent to the underlying structure that this failed. The center of the mass seemed to be soft. The incision thru the periosteum was then enlarged, and immediately a dark hemorrhagic like mass, resembling granulation tissue, presented. The area was fully exposed, some of the periosteum removed, and the above described material was scooped out. The cavity was found in the bone extending back, upward and anteriorly and laterally. Profuse bleeding made it difficult to see, and one had to be guided by a sense of touch. After cleaning out all this soft material and some of the rough bone along the margins, a rather well defined cavity was exposed. The constant oozing was somewhat controlled by packing; it could then be seen that in two small places in the upper wall, the dura was exposed without being directly involved. The edges of the bony cavity were trimmed off, and the entire cavity packed with iodoform gauze. The external wound was left open. Length of operation one hour.

In brief, this seemed to be a tumor arising in the medulla of the bone, particularly in the anterior part of the frontal, where it forms the upper wall of the orbit. The cavity was filled with soft dark red material. This, in the lower part, was directly adherent to the periosteum. A striking feature was the extensive bleeding which seemed to be general. The bony walls of the cavity were smooth.

No reaction followed the operation. At the first dressing some of the packing was removed; considerable oozing. The specimen removed at operation was sent to Professor James Ewing who reported as follows:

"The tumor of the bone in the case of E. N. B. proves to be an adenoma of aberrant thyroid tissue. It is rather orderly in structure and not very malignant, altho in some spots the alveoli are still small and numerous. It reproduces thyroid structure to the smallest detail, many alveoli containing soft acidophil colloid surrounded by flat thyroid cells. Many small alveoli are exactly similar to the usual thyroid

adenoma. The stroma is scanty and not vascular.

"This tumor may arise from a portion of thyroid tissue originally present at that point in the embryo, or it may represent a metastasis of an adenoma in the thyroid. The thyroid gland should be examined for the presence of any small tumor at any point. I am inclined to prefer the former hypothesis, especially if there is no tumor found in the thyroid.

"The prognosis of these cases is not entirely favorable. Altho they have been called 'benign metastasing struma' they are not always benign. They recur locally, and the only other case in the skull which I have seen (Jeffries' case, in parietal bone) recurred locally and eventually produced metastases elsewhere. The thyroid was normal. Hence I recommend that radium be inserted in the wound, as the alveoli penetrate the bone spaces and are hard to reach by the knife. I know of no case treated by radium, but would expect this structure to respond well."

Feb. 24, all of the packing was removed and a radium tube 27 mc. protected by a lead plate introduced for four hours. The thyroid gland seems normal. March first, no reaction, slight secretion superficially; wound is allowed to close.

April first, 1918. The wound healed. A swelling remained at the upper margin of the orbit continuous with a bony mass externally just above the external canthus. Some exophthalmos remains, measuring R. 30, L. 28. Vision normal. Eyeground normal.

April 8th, 1919. Has lost about thirty pounds in weight. Complains of band over head and obscure abdominal symptoms.

July 1st, 1919: R. 31.5; L. 28. Diffuse swelling in orbit. Vision and eyeground normal.

Dec. 19, 1919: The orbital condition is unchanged. Diplopia to the right. Distinct soft pulsating mass in orbit. A swelling had been noted over right scapula for some months, and patient complained of neuralgia in right groin.

Dec. 29th, '19: The patient was referred to Professor James Ewing, who reported as follows:

"There is a tumor mass behind the eye, which causes distinct exophthalmos and protrusion of the supraorbital tissues of about 1 cm. The body of the right scapula is largely replaced by a tumor mass about 5 cm. in diameter, as shown by the X-ray. This tumor is of recent discovery and evidently growing actively. The left portion of the thyroid gland is the seat of a well circumscribed, rather firm tumor mass, about 4 cm. in diameter. There is pain in the use of the right thigh muscles, which was not investigated, but will receive attention later. The X-ray of the right lung shows several suspicious isolated nodules, which I suspect are tumor nodules, but which cannot be positively identified as such. Further X-ray photos of the lungs and bones will be taken. The patient has lost weight, is anemic and rather feeble, and is therefore distinctly cachectic. I feel that the prognosis is unfavorable, but that some help may come from X-ray and radium treatment.

"I would recommend that the tumor of the scapula be treated by X-ray, that the orbital growth be treated at first by a radium pack, and that the thyroid tumor be treated by the insertion of radium needles. This latter tumor is possibly the source of the others. The scapular growth was treated this afternoon. We propose to go after the others slowly, but steadily, avoiding undue disturbance of the patient."

The shoulder tumor was given eleven X-ray treatments from Dec. 29, 1919, to May 18, 1920. A radiograph on January 7th, 1920, showed a destructive process in the 8th rib posteriorly, and an area of bone destruction in pubis to right of symphysis. On Jan. 20th, 1920, a small area of destruction was found in the 6th rib posteriorly. The right groin was treated by X-ray four times from Jan. 6th, to May 4th, 1920. Radiograph on Jan. 7th, 1920, showed dense shadow above manubrium and to the left, of about the size of a small orange, indicating the presence of a calcified mass in the thyroid gland, pushing the trachea over to the right.

The orbit was treated with radium three times from Jan. 19th, 1921, to April 27th, 1921.

The patient, acording to Dr. R. W. Lowe, Ridgefield, Conn., then gradually lost weight, suffered from hallucinations and delusions, and was at times mildly maniacal. There was flatness over anterior and posterior chest (left); pleuritic pain, loss of motion over chest, dypsnea, slight cough. Lymphatic enlargement in neck (left side). Edema of lower extremities, increasing during the last two weeks. Died July 21st, 1921, apparently from cerebral hemorrhage.

In this patient, a tumor in the roof of the orbit was the first symptom of a malignant process. At operation destruction of a bone by a brownish, granulating tissue like mass was found present, unusually free from hemorrhage. The histology of the tumor showed it to be composed of thyroid gland tissues. No tumor could be detected in the thyroid on palpation. Symptoms of other metastases appeared one and one-half years later, and were confirmed by the X-ray examination in the scapula, in the 6th and 7th ribs, in the lungs and in the pubis, and at that time a distinct tumor was discovered in the thyroid gland, and the X-ray showed that it extended behind the sternum.

The location of these thyroid gland tumors in the walls of the orbit is unusual. In the literature, there is a report of a case by v. Eiselberg of a woman, 37 years old, who showed externally a bulging nodule in the substance of the parietal bone, projecting inward and adherent to the dura. Another nodule was situated in the right upper orbital wall, extending thru into the skull. The 6th rib, right, and the left humerus were also involved; struma present (adenomacarcinoma) autopsy report.

Jaboulay's patient, a female, 65 years old, presented a tumor in the superointernal angle of the left orbit, pulsating; old swelling of the thyroid gland. At operation the bone was found perforated, exposing the meninges.

Lymphosarcoma of Orbit With Intermittent Exophthalmos.

Dr. W. S. Franklin and Dr. F. C. Cordes, San Francisco, reported this case: Mrs. M. B., aged 33, was first seen in 1908. Her symptoms were those of a refractive error, namely hyperopia. The eyes were prominent without any apparent etiology. There was no thyroid disease and all other physical findings were negative.

August 1917 (eight years later), patient returned complaining of a slight drooping of the left upper lid. She was under treatment for an acquired lues. The eye findings were: Slight ptsosis of left upper lid. No apparent paralysis. Lid could be voluntarily elevated. Right globe somewhat more prominent than left. Movements of eyeball normal. Tension of left eye 32 mm., right 24 mm. No pupillary changes. Fundi negative. Perimeter fields, stereoscopic vision and color sense all normal.

Dr. Hewlett reported:

"The general physical examination in October, 1916, showed the presence of numerous crackling and musical rales in the left back and axilla. Wassermann reaction was + + +. Sputum negative for tubercle bacilli. On March 3, 1917, the white blood corpuscle count was 7,4000 with 83% of polymorphonuclear cells, 6% lymphocytes and 11% large mononuclears. From March, 1917, to September, 1917, the patient was receiving antiluetic treatment."

By October of the same year, the ptosis of the left eye had increased, with a beginning exophthalmos of 3 mm. The patient continued under most vigorous antiluetic treatment. November 21, 1917, the left eyeball became prominent. There was a marked swelling of the lids with chemosis. The examination for leucemia was negative.

December 20, 1917, the right eye was beginning to show exophthalmos, while the left eye was at its height and with its upward motion limited. Eight days later, the left was receding, and by January 15, 1918, both eyes were somewhat improved. January 20, the left eye was beginning to show recurrent exophthalmos, while the right continued receding, and on February 20, the left was at its acme for the second time, with the right normal. On March 1, 1918, the right was again markedly exophthalmic, with the left stationary, and by March 10, the left receded, leaving the right still somewhat swollen.

When the patient reported on April 5, 1918, the exophthalmos of the left eye was beginning to recur for the third time and the right was normal. On May 10, the left eye protruded markedly, and the right was again beginning to be swollen for the third time. As there was no improvement by July 6, 1918, the patient was put to bed, and by October 2, 1918, both eyes had receded, the therapy limited to hot compresses and rest in bed. The left fundus now showed a beginning optic neuritis.

A month later, a circumscribed nodular swelling was observed in the bulbar conjunctiva at the nasal side of the left eye. There was left sided optic neuritis. A small vesicle developed, which was punctured and showed a pure culture of staphylococci.

Right eye normal. Left eye, marked edema of both upper and lower lids, with chemotic conjunctiva bulging thru palpebral aperture. The globe protruded markedly, the exophthalmos being 10 mm. Entire conjunctiva injected and chemotic; at the inner canthus was a rounded nodule about the size of a pea, which appeared less edematous than the remainder of the swelling. The lower lid was overlapped by the growth, while the upper lid was enlarged, covering the superior third of the mass. The eye was amaurotic and showed a secondary atrophy of the nerve head. A small portion of the nodule was excised for microscopic examination.

The diagnosis was sarcoma of small round cell type, possibly lymphosarcoma. Later a diagnosis of lymphosarcoma was made and confirmed.

January 20, 1919, the left eye was enucleated. A circular incision was made just outside the limbus thru the conjunctiva, which was decidedly indurated. The ocular conjunctiva was dissected back, and the eyeball freed to the apex of the orbit. Muscles and nerve were then severed. The internal rectus muscle was obscured by a soft cellular tumor mass, which involved it thruout its length. Digital palpation of the orbit showed the tumor mass to extend to the apex of the orbit, impinging upon the superior orbital fissure. There was no apparent bony involvment at the superior nasal border of the orbit. Due to the extensiveness of the growth and the likelihood of involvment of the other eye, as indicated by the tumor, and the practical impossibility of radical excision, evisceration of the orbit was decided as contraindicated. All available parts of the tumor were removed and the wound packed.

Anteriorly, the tumor started from the edge of the cornea and was covered for some distance by conjunctival epithelium. It shows apparently little tendency to infiltrate the sclera, and in this region there was some edema of the preexisting tissues. The tumor as a whole was somewhat lobulated. While the main mass tended to grow away from the bulb, yet between the main mass and the bulb there was considerable tumor infiltration into the loose cellular tissue present. Towards the posterior end of the tumor, extensive infiltration of muscle was observed.

On January 25, 1919, the patient received 350 milligram hours of radium to the left orbit (screened by 1/2 mm. of silver and 1 mm. of brass) and an additional 300 milligram hours on February 3, 1919. Healing took place without signs of recurrence, altho there was considerable skin reaction from the radium.

Up to, and including April 26, 1921, the patient reported every few months for observation, and during that time there was no sign of recurrence on the left side, and the right eye was normal. The examination on April 26, 1921, showed V. R. E. 1.2 +. There was no exophthalmos, the exophthalmometer reading being 24 mm. The fundus was negative and the perimetric field for white and colors was normal. In July, 1921, we were informed that the patient had died, death being caused by an acute cardiac decompensation. There was an enlarged spleen, extending down to the pelvis, accompanied by a marked ascites. Several months previously, patient had complained of a chronic cough, and on one X-ray examination, a diagnosis of sarcoma of the lung was made. It was impossible to obtain a postmortem examination. Clinically, the entire picture was rather suspicious of a sarcomatosis.

The right eye was presumably also affected by lymphosarcoma, as its early

changes were identical with those of the left, with the exception of the appearance of the nodular mass. The case can justifiably be considered one of bilateral lymphosarcoma. Several unusual points are to be noted.

The bilateral occurrence of lymphosarcoma with marked exophthalmos is unusual. The occurrence of lymphosarcoma is rather infrequent. Retrogression followed by progression has not been noted. Because of the infrequency of lymphosarcoma of the orbit, we had the pathologic diagnosis confirmed by several independent pathologists. Bilateral exophthalmos due to retrobulbar conditions is comparatively rare. Syphilis had to be considered in this case, due to the triple plus Wassermann. Antiluetic treatment had no effect on our case.

We considered the possibility of lymphomata, but all examinations for pseudoleucemia were negative. Exophthalmos of the intermittent type due to circulatory changes in the orbit, such as telangiectases, cavernomas, angiomata and orbital varices, has been reported. In none of the cases was it due to an orbital tumor. Another interesting feature in our case was the continued observation, postoperatively, for a period of almost two and one-half years, with no signs of recurrence on the operated side or the unoperated eye. It has been observed a number of times, that removal of a tumor on one side, has been followed by improvement of the unoperated eye. The question arises as to the effect on the unoperated eye of the massive doses of radium, and whether or not the effect was sufficient to check the tumor's progress. We have been unable to find in the literature a case of bilateral lymphosarcoma with intermittent exophthalmos of the type described.

Chloroma.

Dr. Arthur J. Bedell, Albany, N. Y., said it seems fitting that we should devote a few minutes to a disease that is even yet subject to discussion, not only from its etiologic standpoint, but especially in relation to earlier diagnosis and subsequent treatment, of which we know so little.

Four cases were summarized, two of which had never been published.

Case 1. J. L., a boy eight years old, of foreign birth, entered the Albany Hospital December 3, 1906. The patient, semicomatose, was extremely emaciated, and his skin was yellowish. The right eye was proptosed 11 mm., with a growth in the upper part of the orbit. The lower orbital region was outlined by a freely movable mass, 12 mm. wide, which extended from the outer to the inner canthus. This mass was not attached to either skin or periosteum and its posterior margin was not palpable. There were two subconjunctival hemorrhages. Complete ophthalmoplegia externa. The cornea was clear. There was a marked optic neuritis with complete obliteration of disc outline, with areas of white exudate along the larger vessels. Vision equal to fingers at six feet.

The left eye was extremely prominent, extending 20 mm. beyond the orbital ridge, with complete ophthalmoplegia externa. The veins surrounding the lids were enormously distended and tortuous. Projecting beyond the superior orbital margin was a firm, freely movable, not adherent growth, which extended deeply into the orbit, and was palpable from the supraorbital foramen outward. The conjunctiva was markedly chemotic with numerous ecchymoses. The upper part of the cornea was clear, but the lower half showed a superficial necrosis and was covered with a dry exudate. Pupil 5.5 mm., not reacting to light or accommodation. There was a deep yellowish gray reflex from the fundus. No detail, no light perception.

Blood examination showed: red cells 1,410,000, white cells 79,600, hemoglobin 30%, and a differential count of 6,000 leucocytes showed: polynuclears 16.2%, large mononuclears 5.3%, large lymphocytes 15.3%, transitionals 0.8%, eosinophiles 0.7%, small lymphocytes 33%, neutrophile myelocytes 28.2%, eosinophile myelocytes 0.5%.

The patient was given chloroform, and a 3c.m. incision was made over the outer half of the superior orbital ridge. The entire orbit was found filled with a greenish mass of almost cartilaginous consistency, in part encapsulated, nowhere palpably adherent to the periosteum.

The patient's conditions grew progressively worse from the date of admission. Emaciation was extreme. Proptosis of both eyes more marked. On the right side the tumor mass increased 2 mm. in width, and the eyelid became darkly congested, with tortuous, prominent vessels. Vision almost totally lost. Pupil 6 mm., not reacting. No increase in the retinal changes. The lower half of the cornea of the left eye was infiltrated and the outer layers eroded. No fundus visible; no decrease in the chemosis; veins more enlarged. No drainage from the wound. The glands of the neck were greatly enlarged; on the left side being as large as pigeon eggs. Veins of the neck showed no signs of thrombosis.

On December 10th, the child had a convulsion, was removed from the hospital and died that day. Autopsy was not permitted.

Case 2. Mrs. N. G., aged 18, married, a Russian by birth, was admitted to the Albany Hospital April 7, 1909. One month prior to admission, she first noticed many small, hard, insensitive lumps in each breast, which she believed had not increased in size. March 8, 1909, she had "pink eye," from which she seemingly recovered; on March 27th, her eyes began to bulge, causing pain and attacks of blindness.

April 8th, the right eye proptosed 20 mm., immobile. The upper lid showed great dilatation of the blood vessels, and altho it covered one-third of the cornea, it could be retracted, while the lower lid was covered with chemotic conjunctiva. A definite tumor mass, 20 by 12 by 8 mm., was outlined over the lacrimal gland, entirely in the lid, with no deep attachment. The superior two-thirds of the cornea was clear, but the lower third showed a dense interstitial and superficial haze. Pupil 1.5 mm. Vision, fingers at 3 feet.

Left eye proptosed 18 mm.; small nodule in the upper lid at the outer side; cornea hazy below, pupil 4.5 mm., stationary. Vision, fingers at 3 feet. A large mass of grayish appearance pressed the retina forward, and except for an occasional vessel, obscured fundus detail.

Blood examination made by Dr. James F. Rooney, April 8th, showed: reds 3,150,000, whites 36,500, hemoglobin 55.0%.

Four days later, the right eye bulged forward 25 mm., with intense engorgement of the veins of the lids and temporal region. The tumor was now 25 x 11.5 mm., axis 60 degrees, not adherent to the skin or periosteum, altho extending deeply into the orbit. The outer part of the lower lid was filled by an oval, unattached growth, 18 by 9 mm., x 11.5 mm., axis 60 degrees, not adherent; eyeball, including the entire cornea, was exposed. The conjunctiva was chemotic, with many small ecchymoses, and a small hypopyon in the anterior chamber. Pupil 2 mm., stationary, tension normal; extremely limited motion of the globe; vision light perception.

Left eye proptosed 22 mm., with many irregular nodular masses in the upper, outer two-thirds of the orbit, close to the superior wall, but not adherent to it. The upper half of the cornea was covered by a vein-filled upper lid, the lower half was rough and infiltrated. The bulbar conjunctiva was decidedly congested and the eyeball stationary. The interior of the eye was as before. Pupil 4.5 mm.; faint reaction to light, tension normal.

The disease was diagnosed chloroma by the examination of breast tissue. This was done before the patient died, on April 16, after a premature delivery of a dead child. As in many cases, persistent, uncontrollable nasal hemorrhage was present for several days before death.

The following is the autopsy report by Dr. Wolbach, held April 16, 1909:

Autopsy limited to chest and abdomen, so that the orbits were not investigated.

Anatomic Diagnosis. Chloroma with metastases to sternum, heart, bronchial nodes, kidney, pancreas and lymph nodes.

Case 3. B. R., age five years, entered the Albany Hospital April 23, 1913, and was discharged May 16, 1913. The dominant symptom was a firm, ovoid growth occupying the upper one-half of the right orbit, producing the effect, as shown in the illustration, of a mass anterior to the eyeball. The skin was freely movable over it but the tumor extended deeply into the orbit. The right eye was movable in all directions, without fundus lesion. The left eye and

orbit were uninvolved. The patient had a peculiar sallow appearance. He had several slight hemorrhages from nose.

The blood count showed: white blood cells 7,700, red blood cells, 1,930,000, hemoglobin 55%.

The temperature ranged from 99° to 102°. Wassermann reaction was negative. Before the child was taken home, where he died June 5, 1913, the right eye became very prominent with practically no motion. Definite masses, similar to that in the upper lid, also appeared in the lower, filling the orbit. A firm lobulated tumor, deep in the left orbit, produced marked exophthalmos. The temporal region became infiltrated. The hearing was greatly reduced. There was no marked glandular enlargement. The patient died with meningitic symptoms.

Case 4. J. N., a girl seven years old, of foreign extraction, entered school a year ago and seemed to be normal in every way. After being in school a few weeks, she began to complain of headache and would cry for hours. On July 4, 1921, the child's right arm was severely burned, and she was sick for three weeks. On October 27, the right eye bulged forward 11 mm., with limitation of motion vertically but not horizontally. There were several large, rounded masses, freely movable beneath the skin but extending into the orbit, and seemingly adherent to the superior orbital ridge. There were also masses in the lower portion of the orbit, with the same characteristics. The pupil was 6 mm., stationary, media clear with an intense neuroretinitis, many areas of whitish exudate and several flame shaped hemorrhages. The left eye protruded 8 mm., with the same type of masses extending deep in the orbit. There was definite swelling of the optic nerve with retinal exudate. In both temporal regions there was a firm swelling, and the patient was totally deaf.

I sent her to the Albany Hospital with a diagnosis of chloroma. This was verified by the blood examination which showed:

Red blood cells 3,100,000, white 20,800, hemoglobin 67%.

Temperature, which on admission was 100°, dropped to 98° the next morning, but then rose above 103°. The parents took the child from the hospital when they were told that the outcome would be fatal. The child died at home November 9, 1921, and it was impossible to get an autopsy.

In the complete review of the literature, we find that ninety cases have been reported, twenty-five females, five sex not stated and the remainder males. The age varied from one year and nine months to fifty-five years; by far the greater number being in children and young adults. The duration of the disease was so uncertain, that even in the statement that many died within one month, some even within four days after the primary visit, helps little in the diagnosis. The greatest number of cases were only properly understood at autopsy.

The reported white counts varied from 6,200 to 519,600. In only six cases, however, was it 100,000 or more. The commonest count is less than 40,000, and as will be noted in our own cases, one count was 6,200. On the other hand, the differential count gave information of the greatest value, for in all cases we find a marked decrease in the polymorphonuclears with a considerable increase of the myelocytes.

The diagnosis of this condition can be made early. Every case of exophthalmos in a child should have an immediate complete blood examination, for, as has been proven by many and corroborated by our cases, the first symptom is in the blood change.

The treatment has ranged from benzol, to X-ray, to radium. The lack of curing power, when late at least, is evidenced by the fatal outcome of all cases.

Chloroma, a disease of the blood making organs, lends itself to early diagnosis by its characteristic blood picture. The common eye symptoms are lid and orbital tumors, exophthalmos, subconconjunctival hemorrhages, retinal hemorrhages and exudate, neuroretinitis and blindness; altho frequently unilateral, most often the changes become bilateral; and finally, investigation will doubtless prove an infection the origin of the disease, and such infection will be diagnosed and cured.

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EXERCISES FOR HETEROPHORIA.

The ocular muscles are present in the oldest and lowest forms of vertebrates. In some of the primitive fishes, they have forms, development and individual functions strikingly similar to those of the ocular muscles in man. But binocular vision, as developed in man, is wholly absent until we reach the order of primates, to which man belongs. The ability to fix the same point with both eyes is quite absent in most mammals. Nothing like the development of the macular and foveal region in the retina is found below the primates. The lower mammals have neither the histologic structure, nor the functional control of their eye movements, that furnish a basis for binocular vision.

Heterophoria is a disorder of binocular vision. In a man with one eye, it cannot exist. It is not connected with the presence or development of individual muscles; but with the coordination of their actions; and specifically with those coordinations which have to do with the fixation of both eyes upon the same point. Such coordination of the movements of the two eyes is impossible in comitant squint. In heterophoria it may be quite accurate, but it is not easily maintained. Perfect and easy coordination is not dependent on the size or strength of the muscles to be controlled, but on the perfection of the controlling mechanism in the central nervous system. Exercises for correction and relief of heterophoria are not primarily "muscle exercises," but are exercises in nerve control.

A common conception of the results of "exercise" is that of the muscles of the blacksmith's arm. The weighted contraction of certain muscles produces great development in bulk and power. The ability to shorten the muscle against resistance is increased. But the hypertrophied muscle is not necessarily any shorter than the undeveloped muscle when at rest. The "tonus" of a muscle, which determines its length when at rest—not contracted by voluntary effort—seems to be kept up and modified by nerve impulses that come thru the central nervous system, but probably start from sensory impressions and afferent impulses in general; and it is not dependent on the bulk of the muscle. The balance between opposing ocular muscles does not depend on their size, or power of

overcoming resistance; but on the coordination, the proportionate distribution of these nerve impulses among the opposing muscle. This fact must be appreciated to avoid a grossly mechanical conception of nerve-muscle actions, which would make us seek the correction of heterophoria by crude mechanical changes in the muscles.

We have absolutely no evidence that any form of "exercise" produces, even in slight degree, changes in the ocular muscles, comparable with those in the blacksmith's arm; or that such changes would bring about the change in the relative length of the opposing ocular muscles that would give orthophoria. Indeed, contracture, shortening of a muscle, often occurs as the muscle undergoes atrophy; and such contracture would turn the eye in the direction of the atrophic muscle. The essential change that brings about the erect carriage of the soldier is the change in nerve impulses going to the muscles of his trunk; at first it is the change in voluntary impulses, and later the change in those that produce muscle tonus. This may not be attended by any increase in the bulk of his muscles, altho generally there is such increase. The carriage of a stonemason or a foundryman may be much improved, without increase in the bulk of any of his muscles.

There is a striking absence of evidence of hypertrophy in the contracted muscles of squint, even squint of high degree that has existed many years. The muscle is shortened but its total bulk or weight is not increased. There are no facts showing, directly or by analogy, that increase in the bulk of an internal rectus muscle would correct exophoria; altho the habit of indefinite confused thinking on the subject may have convinced us that such should be the case. The ocular muscles are unfavorably situated for producing hypertrophy by exercise. Increased resistance to the contraction of a rectus muscle can only be brought about by increased action of its muscular opponents; or by extending the movement it produces to its limits. The movements of the eye are checked, not by resistance gradually increasing and furnishing a stimulus to greater contraction of the muscles exercised; but by nonextensible bands, the check ligaments, which set a definite limit to the excursion of the eye in any direction. The limits thus set cannot be altered by any form of exercise. By attaching weights to the insertions of the muscles and executing the usual movements of the eye with them, as has been done to test the power of individual muscles, we might develop a true hypertrophy and increase of power in an individual muscle. But it is doubtful if this would alter the muscle tonus, or change the rest position of the eye.

Exercise of convergence, particularly the fixing of a pencil point brought slowly to and within the near point of convergence, or turning the eyes strongly laterally; or "weighting" the divergence; by prisms base in, when the eyes are fixed on a near object, and then slowly increasing its distance may tend to increase the power of the muscles thus exercised. But prisms placed in succession before the eyes, to be "overcome," simply excite changes in the innervation of the eye muscles to avoid diplopia. This may in time change the habitual tonus of these muscles and their state of balance when at rest.

It is probable that turning the eye in a certain direction and contracting all the ocular muscles at once, as one does with the muscles of the upper extremity when arm and hand are held rigid in a certain position, may influence the balance of the ocular muscles. Exercises Nos. 6 and 11 of Walter Camp's "daily dozen," in which the eyes are directed toward an extreme position, while many muscles are strongly contracted in a "stretching" movement, are certainly of value in heterophoria. But the most valuable exercises for heterophoria are such games as tennis, polo, hand ball and basket-ball, in which accurate fixations of the eyes are closely coordinated with active movements of the whole body.

In regard to exercises for heterophoria, there is need for better understanding of certain points in the physi-

ology of "hypertrophy" and "tonus" of muscles, and the relations of muscle power and coordination. There should be more definite thinking about just what is to be accomplished for the relief of heterophoria. There should be careful observations as to the changes of muscle balance, brought about by changes of innervation produced by the wearing of correcting lenses, or lenses that increase or relieve accommodation. The effect of exercising a "loaded" rectus muscle would be an interesting addition to our knowledge. Finally, the effects of broader exercises of muscles and nervous system on heterophoria and its symptoms, should be more generally in mind. The dominant thought of modern medicine is, that the body must be considered as a whole, all its parts interrelated and interacting; and this is most evidently true of muscle exercises, and coordinations thru the nervous system.

E. J.

SCLEROCORNEAL TREPHINING IN MADRAS.

It was in the Government Ophthalmic Hospital at Madras, India, that Elliot first worked out, applied and reported trephining at the sclerocorneal junction for glaucoma. This was more than 12 years ago. Undoubtedly his patients who were operated on in this way, about that time, are seen or heard from occasionally in that service; so that the longest experiences of the late results of such operations are there obtainable.

Altho Col. Elliot's name is still honored at Madras in the Elliot School of Ophthalmology, his reputation has been based largely on the value of this operation. Another generation of operators has succeeded him, with their own points of view and their own ambitions to leave their impress upon ophthalmic practice. It is therefore of interest to learn from the last Report of the Government Ophthalmic Hospital just what importance is attached to this operation in the clinic in which it originated. In this report for 1921 we read;

"Elliot's operation is still almost invariably performed for glaucoma. One exception is constant, namely acute secondary glaucoma due to swelling of the cataractous lens in which complete broad peripheral iridectomy is done. This condition, which is fairly common, is always dealt with in the acute state, and the results are very good. We prefer to give a general anesthetic as the eye is excessively tender and the operation is possibly the most difficult with which we ordinarily have to deal. It will be observed that not only is trephining done for glaucoma, primary and secondary, but also for staphyloma; in which it is usually combined with radical cauterization or conjunctival flap treatment of the protuberant scar tissue. It is also adopted in many cases of extensive leucoma adherens following ulcus serpens, in order to protect the eye against subsequent glaucoma due to narrowing of the angle. Such cases are done as soon after the ulcer is healed as is reasonable from the points of view of a clean conjunctival sac and a stationary leucoma. If possible, the trephining in such cases is combined with optical iridectomy. If there is any clear peripheral cornea in the inferior nasal quadrant, this site is selected. A certain number of cases were trephined after cataract operation, either because of increased tension, or because we feared this sequel on account of the diminution in the total available angle, owing to involvement of the pillars of the coloboma or other impactions in the section. When the pillars of the coloboma become adherent at their bases and capsule is impacted in the upper part of the section, it means that about 1/6 to 1/3 of available angle is thrown out of action. It is not desirable to lose sight of such patients. We prefer to protect such eyes by a prophylactic trephining.

Encouraged by last year's successes in trephining eyes which had been blind for over three months, we have extended the period which limits our operative interference. We now trephine eyes which have been blind for

six months and under. So far, we are not aware of any case in which an eye blind for six months regains any perception of light after operation. Last year's cases constitute our justification for the procedure now adopted."

The total of trephinings done last year seems to have been 309. Of these 239 were for glaucoma, 41 for staphyloma, 12 after cataract extraction, retinitis pigmentosa 8, detached retina 4, recent leucoma 2, and spontaneous dislocation of the lens 1, while twice the trephining was repeated. These figures regarding an operation in constant use for 12 years seem to indicate, that under the conditions of this clinic and for the patients that apply to it, sclerocorneal trephining is about as well established as any operation in ophthalmic surgery.

E. J.

BOOK NOTICES.

Report of the Government Ophthalmic Hospital, Madras for 1921, Major R. E. Wright, I. M. S. Quarto, 38 pages. One plate with 3 illustrations, Madras Government Press, 1922.

Of this large pamphlet, 4 pages are given to administration report and statistics; and 34 to the "professional report." The latter is chiefly taken up with scientific matter of the highest interest to the ophthalmologist. Much of this is so condensed, that the amount presented is quite out of proportion to the size of the publication. Each page is equivalent to about two or three pages of the ordinary text-book. This series of reports should go into every complete library of works on ophthalmology. The illustrations give parts of the temperature chart and sketches of the fundus, in a case of subhyaloid hemorrhage in the macular region occurring with malaria.

The reports of former years seem to have been prepared by Lt. Col. Kirkpatrick, the Superintendent, now absent on leave, and Maj. Wright, the Acting Superintendent. The present issue contains reports upon special conditions and cases by eight members of the staff, with comments by Maj. Wright. The topics thus discussed include the spontaneous dislocation or rupture of Morgagnian cataract, keratomalacia, spontaneous dislocation of small lenses with glaucoma, malarial amblyopia, encephalitis lethargica, neuritis from sinus disease, Mooren's ulcer, fundus changes in polycythemia, serum treatment of trachoma, leprous iritis, and a dozen others. These clinical observations, briefly recorded, are of such practical value, that we shall quote from them in these pages in subsequent issues, since they are not elsewhere accessible to western ophthalmologists.

In connection with the Elliot School of Ophthalmology, attention is called to journals and transactions lacking to complete their files of ophthalmic journals, and to a short list of duplicates available for exchange. The school and hospital together constitute a rather important center for ophthalmic training. In addition to 178 medical students given instruction in this branch during the year, 20 Civil Assistant Surgeons and 30 Sub-Assistant Surgeons took a postgraduate course in ophthalmology. The other postgraduate students numbered 20, of whom 2 were from overseas.

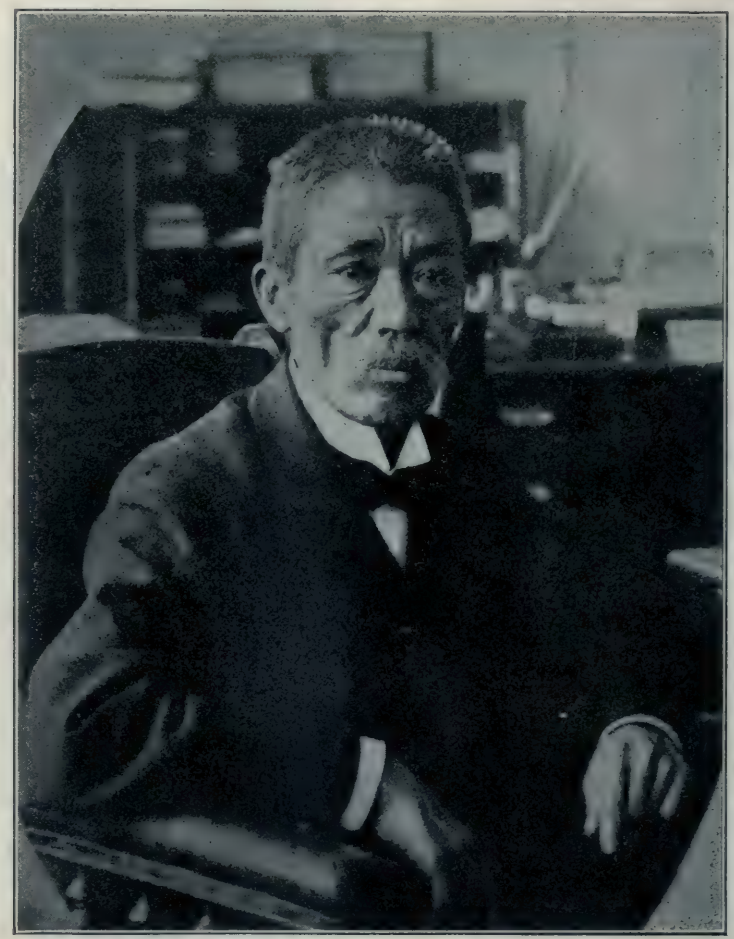
The number of out-patients treated in the Madras Ophthalmic Hospital was 19,828, and of in-patients, 4,023. The number of operations performed was 4,356, of which 1,508 were for cataract. It is interesting to note that among these were 56 by the Barraquer method, 8 with loss of vitreous, 3 failures, and 6 others giving vision of 2/60 or less. Of 8 expression operations done after the "Smith-Indian" method, 7 ranked as successes and 1 with vision between 6/36 and 2/60. Among the other common operations were 284 sclerocorneal trephinings, of which mention is made elsewhere; and 224 excisions of the lacrimal sac.

This series of reports shows from year to year a growth and development that it is to be hoped will continue. Already it is one of special value to the ophthalmologist seeking to meet the difficulties of daily practice. E. J.

BIOGRAPHIC NOTICES.

PROFESSOR IKUJIRO ASAYAMA, a "Samurai" or knight of the Zeze clan in the province of Omi, was born at Yedo (now Tokyo) in the year 1861. He graduated from the College of Medicine of the Tokyo Imperial University in 1884. In the same year, he was appointed an instructor in the Kyoto Medical School, and later was made head of the department of ophthalmology. In 1898, when the College of Medicine of the Kyoto Imperial University was created, Doctor Asayama was sent to Europe to study, by the Department of Education of the Imperial Government, with the purpose of preparing him to take charge of the department of ophthalmology upon his return.

He spent four years in special study of ophthalmology at the Universities of Berlin, Würzburg, Heidelberg and Vienna. At Heidelberg, under Professor Leber, he took up the subject of the absorption of the aqueous from the anterior chamber. At Vienna he gave his time to the study of sympathetic ophthalmia under Professor Fuchs. While still abroad, in 1901, Doctor Asayama was appointed assistant professor of ophthalmology and head of the department in the College of Medicine of the Kyoto Imperial University.



Prof. Ikujiro Asayama, 1861-1915.

Upon his return to Japan in 1902, he was promoted to a full professorship, a position which he held until his death. The following year he presented his thesis and received the degree of M.D.

During the Russo-Japanese war, Doctor Asayama was in charge of the eye unit at the Osaka reserve hospital. For his services to the country at this time, the Fifth Order of Merit and the Order of the Sacred Treasure were conferred upon him. Still more honors were later bestowed upon him. In 1912 he was raised to the Fifth Class rank, and was granted the Fourth Order of Merit. Three years later, when the doctor was on his death bed, His Majesty the Emperor, by special grace, promoted him to the Fourth Class rank. This distinguished physician passed away at Kyoto on the 9th of November, 1915, at the age of 54.

Two strongest features of his character were faithfulness and a high sense of duty. He was upright, sincere, eager to learn, and uncompromising in his search for truth. He did not accept new theories readily; but, once accepted, he followed them unswervingly, and could not be led to change his mind. He prized truth and abhorred vanity. His method of teaching was not so much to instil learning into the minds of his pupils, but rather to draw the students out and encourage them to discover truth for themselves—a distinct contrast to the spoon-fed methods usually employed in his country. Thus the students in his courses, being pressed with question after question, as the professor energetically pursued the subject from point to point, often were baffled for a time; but gradually they were stimulated to increased effort, and finally an eager spirit of inquiry was aroused, which produced the desired results.

Professor Asayama was a prodigious worker, but realized the necessity for an occasional complete relaxation. His favorite pastimes were fishing and travel, especially in his own country.

His scientific research was almost entirely confined to the pathologic anatomy of the eye, in which he was considered the most eminent authority in Japanese scientific circles. It was he, moreover, who first described the socalled retinitis centralis, which created so much discussion at the time of its publication. Doctor Asayama's paper on this subject was published in Volume II, No. 2, of the Nippon Ganka Gakkai Zasshi in the year 1898, and is still considered one of the best treatises on that disease.

The doctor was one of the promoters of the Nippon Ganka Gakkai Zasshi, now the leading ophthalmologic journal in Japan, which was for a time the sole organ of the Nippon Ganka Gakkai, which is the name for the Japan Ophthalmological Society. After provisional rules had been drawn up, he had copies distributed among the projectors, and the journal was finally started in 1897. The title was later changed to the present one, but the object has continued the same thruout and steady progress has been made, thanks in great measure to Doctor Asayama's efforts. Not only did he attend the general meetings of the society regularly, but he also published most of his articles on research work in its journal.

Professor Asayama was a man of great administrative ability. The present building of the Ophthalmological Department of the Kyoto Imperial University, which was completed in 1910, was planned by him. It is said that, in point of completeness, its equipment is unequalled in any other country.

The writer, in a tour of hospitals and medical schools in the summer of 1920, visited the medical college and hospital of the Kyoto Imperial University, and found the space for clinical and research work and the equipment in the department of ophthalmology superior to anything else he saw in all the rest of Japan. At that time, he met the late Doctor Asayama's able successor, Professor Ichikawa, and had ample opportunity to see for himself the results of the splendid work that had been performed by Doctor Asayama, as well as the magnificent way in which the work is now being carried on by the present head of the department.

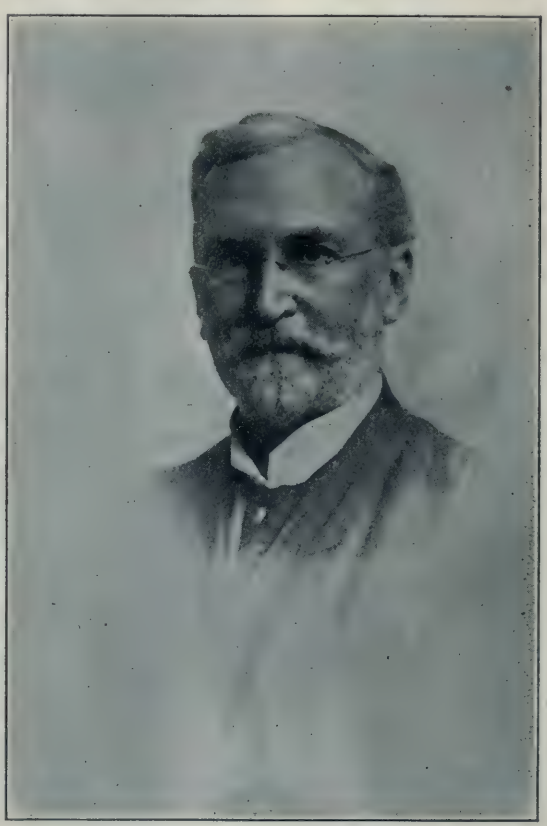
In connection with his extensive research, Professor Asayama wrote many scientific papers, among which the following are probably the best known:

1. An Exhaustive Histologic Study of a Case of Ophthalmia Sympathetica.
2. On the Anatomy of the Ligamentum Pectinatum.
3. On the Absorption of Aqueous from the Anterior Chamber.

4. On the Pathology of Keratitis Punctata Superficialis.
5. On Ulcus Rodens.
6. On Retinitis Centralis.

One of the greatest contributions that Professor Asayama has made to ophtholmology in Japan has been the fact that he gathered around him a group of earnest students, who quickly caught the spirit of their great teacher, and who are now counted among the leaders that are advancing ophthalmology in Japan by scientific methods and research. In point of history, he came just a little later than Professor Komoto of Tokyo, and in a true sense shared with him in establishing the specialty of ophthalmology on such a high plane in Japan. No greater tribute can be paid to him than to state that among his former students may now be counted many Professors or Associate Professors of Ophthalmology in Japanese medical schools, of whom should be mentioned Professor Ichikawa of Kyoto Imperial University; Professor B. Koyanagi of Tohoku Imperial University; Professor S. Suganuma of Keio University Medical College, Tokyo, and Professor Y. Matsuoka of Nagasaki Medical College.

HARVEY J. HOWARD.



George Milbry Gould, 1848-1922.

GEORGE MILBRY GOULD, Atlantic City, N. J., died at his home, after an illness of three hours, from heart disease, August 8th, aged 74 years. Dr. Gould was born in Auburn, Me., Nov. 8th, 1848, the son of George T. Gould and Eliza A. G. He served in the Civil War, 63rd Ohio Vols. as a drummer boy in 1861-2, and as a volunteer in 1864-5. In 1873 he received his A. B. degree from the Ohio Wesleyan University and the A. M. in 1892. He attended the Harvard Divinity School in 1873, and served as a Minister until he took up the study of medicine.

He became an M. D. at Jefferson Medical College in 1888, and began practice of the specialty of ophthalmology in the same year. Dr. Gould was Ophthalmologist at the Philadelphia Almshouse in 1892-4. He was editor of the Medical News 1891-1895; Philadelphia Medical Journal 1898-1900 and American Medicine 1901. Dr. Gould was a Fellow of the College of Physicians of Philadelphia; member of American Ophthalmological Society and President of the American Academy of Medicine in 1895. He was a speaker of the Congress of Arts and Sciences at the St. Louis Exposition in 1904. He received the first Doyne Medal of the Ophthalmological Congress at Oxford England.

Dr. Gould was internationally known as an author of medical and ophthalmologic works. He came to Atlantic City more than ten years ago in search of health, and as a haven of rest from more than twenty-five years of literary work. Among his works "Anomalies and Curiosities of Medicine," 1901; "Compend of Eye Diseases," (in collaboration, 1886); "Diseases of the Eye," 1879; "American Year Book of Medicine and Surgery," 1896-03.

His illustrated Dictionary of Medicine, Biology and Allied Sciences first appeared in 1894. Upon it were based the Students' Medical Dictionary, the Practitioners' Medical Dictionary, the Dictionary of New Medical terms and the Pocket Pronouncing Medical Lexicon. In ten years after the appearance of the first of these, 166,000 copies of his dictionaries had been sold. Of books addressed to readers outside the medical profession, he published "Boderland Studies," 1897; "Biographic Clinics," 6 vols., 1904-08; "Concerning Lafcadio Hearn," 1908; "The Infinite Presence," 1910; and "The Life and Letters of E. C. Stedman," (in collaboration) 1910. He was a man of varied interests with a broad point of view and a thoro writer.

FREDERICK FRISCH.

ABSTRACTS

Pereyra. Retinal Hemorrhages from Malaria. Arch. di Ott., 1922, v. 29, p. 49-78.

In a review of the literature on this subject, the author mentions various ocular changes which malaria can produce in the eye. Among these are three types of corneal affection, dendritic, herpetic and interstitial keratitis, all of which may be due to malaria. Conjunctivitis, iritis and choroiditis may also occur in cases of malaria. The nerve may also show a number of changes, the most common of which are: 1, simple hyperemia; 2, papillitis; 3, retrobulbar neuritis; 4, acute endocular neuritis; 5, neuroretinitis; 6, atrophy, which in all cases is secondary to an inflammatory process.

The retina may show pigmented changes, the result of chorio retinitis and endarteritis of small vessels, and may even be ruptured by pathologic adhesions between the retina and vitreous. The author is especially interested in retinal hemorrhages, on account of having seen a number of cases and having opportunity to examine the eyes of one at postmortem. He examined three cases in which the retinal hemorrhages were in a fresh stage, and was able to follow them during absorption. One case died of pneumonia during observation. Two more cases were seen some time after the active trouble had subsided.

The three active cases showed lesions quite similar in type. Each had rather large hemorrhages involving the upper half of the macular region, but not including the fovea, so that central vision was fairly well maintained. These were all of the superficial type, apparently pushing forward the internal limit of the membrane of the retina slightly, and being concave above and convex below. In several eyes there were two or more of these rather large hemorrhages. In all cases they absorbed rather completely altho somewhat slowly, and good central vision was regained in all but the case which died. Yellowish spots, with a slight amount of pigment around the border, remained from the hemorrhages that had absorbed. In the two old cases, areas of depigmentation marked the site of former

hemorrhages. The two cases of estivoautumnal fever were more severe than the case of tertian. The case which came to postmortem was especially interesting, since it presented the ordinary type of malaria, all previous cases having been patients dying of malarial cachexia or severe anemia. Sections showed that the hemorrhage was confined to the internal layers of the retina and chiefly to the nerve fibers. The internal limiting membrane of the retina was raised slightly around the large hemorrhage, and in one place near the fovea, the blood had produced a fissure thru the thickness of the retina. Pigment granules, probably from broken down parasites, were present, free and in the leucocytes. No plasmodia were found, probably because of fixation in formalin.

S. R. G.

Vogt, A. Ophthalmoscopic Examinations of Macula Lutea in Red Free Light. Klin. M. f. Augenh. v. 66, 1921, p. 321.

The red free light of ophthalmoscopy shows the macula in its yellow color. The dark fundus ordinarily appears light grey, instead of red, and can in a certain degree be placed in parallel with the fundus in red free light, for the retinal image is naturally less veiled by the choroidal light than in the eyes of common pigmentation. Hence it is well known that particulars of the retina, particularly reflexes, are especially clear in dark fundi. The red free light gives especially favorable conditions. The macula lutea is only the central yellow part of the fovea, including the "foveolar reflex," while the fovea is the whole pit of about the size of the optic disc. The yellow color of the macula in red free light is of great practical value, as it allows the finding of this most important area of the retina in cases in which this is not possible in ordinary ophthalmoscopic light.

Vogt describes very different conditions with the disappearance of the yellow color, including 3 albinos and a girl with albinotic fundus, in which it was undoubtedly congenital. It was acquired in retinitis, detachment of the retina, and blindness from traumatic interruption of the blood supply.

An affection of the yellow field is the honeycombed macula, apparently cystoid degeneration. Vogt found it in several cases of retinitis pigmentosa. In other cases, it could be proven that the cyst formation led to a hole of the macula by rupture of a cyst. Cystic remnants in the bottom of the hole are a differential diagnostic sign of the hole formation from the posttraumatic. If in an otherwise healthy eye the yellow zone is absent, it is pathologic, as shown in 2 cases with impaired central vision.

C. Z.

Babonneix, L. and Hallez, G. L. Infantile Cerebral Hemiplegia and Hemianopsia. Gaz. des Hôp. 1922, v. 95, p. 997.

This condition was first observed by Freud in 1889, and then by Vogt, but cases are rare. The patient, a boy of 2 years, suffered during his first months with repeated vomiting and diarrhea. At the age of six months, he had convulsions located in the face, with nystagmus, lasting some seconds. These have reappeared about every 3 months, at first tonic, then clonic. At the age of 7 months, generalized convulsions, with high fever and paralysis, chiefly of the left side. Ophthalmic examination by Dupuy-Dutemps showed, at the present time, a constant deviation of the eyes to the right, the pupil never passing the mediopalpebral line to the left. But there is no paralysis of movement toward the left, as the eyes turn toward the left during the process of examination. While a left hemianopsia cannot be proven, it probably exists, since the child turns neither head nor eyes to the left when the light comes from that side. This probably explains the turning of the eyes to the right.

C. L.

Purtscher, A. Treatment of Prolapse of the Iris. Wien. med. Woch. 1921. No. 24, p. 1078.

In order to obtain a solid and flat scar in exposed prolapse of the iris, Purtscher applies several times daily a 2% solution of nitrat of silver, neutralizing it with sodium chlorid. The silver solution can be gradually increased to 5%. In suitable new cases the prolapse is excised.

H. A.

NEWS ITEMS

DEATHS.

Dr. Julius G. Ehrhardt, St. Louis, Mo., died September 3rd, aged 75.

Dr. Frank Fisher, Philadelphia, Pa., died September 5th, aged 68.

Dr. Edward H. E. Stack, of Bristol, England, died in London, August 3rd, aged 55.

Dr. Theron Yeomans Sutphen, Newark, N. J., died in Maine, August 24th, aged 72.

PERSONALS.

Dr. D. G. Golding, of Fresno, has located in San Francisco.

Dr. Louis S. Dixon of Boston has retired from active practice.

Dr. Hans Barkan has returned to San Francisco after spending nine months in the European clinics.

Dr. Bárány, formerly of Vienna, and winner of the Nobel prize, will give courses in Denver and Los Angeles in November.

Dr. Edward M. Talbot, late Lt.-Colonel Medical Corps, United States Army, has located in San Francisco.

Dr. F. L. Stauffer has returned to practice in Salt Lake City after a year of postgraduate work in Philadelphia and Boston.

Dr. A. E. Gill of Denver has gone to Salt Lake City to assist Dr. C. A. Broaddus in the government's work in eye, ear, nose and throat.

Dr. J. H. Farrell, of Honolulu, is spending several months in Vienna doing some investigation work on the eye.

Miss Ida C. Mann, of London, has been appointed to the Henry George Plummer Fellowship in Pathology.

Mr. A. L. Whitehead has been elected president of the Section on Ophthalmology of the Royal College of Medicine, 1922–1923.

Dr. Charles H. Hoffhine has recently been appointed a member of the consulting staff of the Bureau of Juvenile Research of Ohio.

Dr. W. Uhthoff, professor of ophthalmology in the University of Breslau, has retired, and the chair has been offered to Dr. A. Bielschowsky.

Drs. Ray A. Irvine, F. H. Raley and C. A. Broaddus, all of Salt Lake City, Utah, attended Professor Fuchs' lectures in San Francisco.

Dr. Horace G. Merrill has resumed practice of the eye, ear, nose and throat, in Provo, Utah, after a year's absence for postgraduate study in eastern cities.

Dr. and Mrs. George N. Huber, of Coffeyville, Kansas, returned September 15th from three months spent in California, Pacific Northwest, and the Canadian Rockies.

Dr. F. J. Pinkerton, of Honolulu, is spending several months in the States. He will visit the large clinics and review some of the more recent work in eye, ear, nose and throat.

Dr. Edward Jackson read a paper before the Utah, Wyoming, Colorado Section of the American College of Surgeons, which met in Salt Lake City, September 12th, on "Ocular Muscle Transplantation."

Drs. Allen Greenwood, W. Holbrook Lowell, Frederick H. Verhoeff, Leon W. Jessaman, L. Maud Carvill, and John G. Jennings have removed their offices from 101 Newbury Street to 82 Commonwealth Avenue, Boston.

The Italian military authorities recently presented Dr. E. Trombetta and Dr. S. Santucci, ophthalmologists connected with the University of Turin, with an illuminated address and gold medal in appreciation of special services rendered.

Acting Assistant Surgeon Clarence E. Downes, head of the Trachoma Hospital at La Moure, North Dakota, has been succeeded by Acting Assistant Surgeon W. C. Thomas, head of the Trachoma Hospital at Pikeville, Kentucky. Dr. Downes will take Dr. Thomas' place at Pikeville.

Professor E. Fuchs of Vienna has been spending several weeks in Honolulu. He gave there two interesting lectures, one on the history of ophthalmology, and the other on the early diagnosis of arteriosclerosis of the retinal vessels. Both lectures were immensely enjoyed by enthusiastic audiences.

SOCIETIES.

Salt Lake has just entertained the Pacific Coast Oto-Ophthalmological Society, and also the Western Section of the American Laryngological, Rhinological and Otological Society. The meeting was of three days' duration, of which the latter named society occupied the last day.

Seventy-one specialists registered for the meeting, including Drs. W. L. Benedict, of Rochester, Minn.; Thos. E. Carmody and Edward Jackson, of Denver, as invited guests.

The society has a membership of over two hundred. For next year (1923) the following officers were elected: President, Dr. W. Humes Roberts, of Pasadena, California; first vice-president, Dr. Kaspar Pischel, of San Francisco; second vice-president, Dr. A. W. Morse, of Butte, Montana; and secretary-treasurer, Dr. C. Benson, of Los Angeles. The 1923 meeting will be in Los Angeles, probably a week before the American Medical Association Meeting in San Francisco the week of June 25–29, 1923.

The Minneapolis meeting of the American Academy of Ophthalmology and Oto-Laryngology held under the presidency of Dr. Walter R. Parker, of Detroit, was notably successful. Almost 400 Fellows of the Academy registered, and the attendance at the course of graduate instruction was about as large. The most notable guest was Professor Robert Bárány, of Upsala, who opened the discussion on Nystagmus, and presented a paper on "Modern Views Concerning the Labyrinth." For the ensuing year the officers elected were: President, Thomas E. Carmody, Denver; first vice-president, Hunter McGuire, Winchester, Va.; second vice-president, John A. Morse, Minneapolis; third vice-president, S. Hanford McKee, Montreal, Canada; secretary, Luther

C. Peter, Philadelphia; treasurer, Secord H. Large, Cleveland; editor, Clarence Loeb, Chicago. Members of the American Board for Ophthalmic Examinations: Edward Jackson, Denver, and Lee Mastin Francis, Buffalo. The committee on graduate instruction: W. P. Wherry, Omaha; H. S. Gradle, Chicago; E. C. Ellett, Memphis; and William R. Murray, Minneapolis.

MISCELLANEOUS.

A bequest of $2,000 has recently been made the Eye, Ear, Nose and Throat Hospital of New Orleans, by the will of William G. Vincent, on the death of Mrs. Vincent.

Construction work will soon be started on a new eye, ear, nose and throat hospital at Charlotte, North Carolina. The plans call for a four-story brick structure.

The ophthalmologic department of the Massachusetts General Hospital, Boston, announces the bequest of the principal of the estate of George D. Loud, eventually.

The National Committee for the Prevention of Blindness reports that wood alcohol, peddled as whisky, caused 130 deaths and 22 cases of blindness in twenty-one states during the first six months of 1922.

A school for the blind, the first of its kind in Armenia, is to be opened in Alexandropol, Armenia, by the Near East Relief, under the direction of Dr. R. T. Uhls, of Kansas City, Missouri. The pupils will be 150 Armenian war orphans, aged five to fourteen years. Most of them are victims of trachoma. It will be called the Cleveland House, because the city of Cleveland has provided funds for its maintenance.

Announcement of a gift of $20,000 each from Mrs. E. C. Gale and Mrs. Frank C. Todd, of Minneapolis, toward the construction of a $190,000 eye, ear, and nose hospital at the University of Minnesota, is made by A. J. Lobb, university comptroller.

Work on the new hospital, which is to be known as the Todd Memorial Hospital, will begin some time before July 1, 1923, Mr. Lobb said.

To the $40,000 gift of the two Minneapolis women, the university is adding $150,000. The hospital will specialize in ear, eye and nose diseases, and will furnish clinical work for medical students, as well as provide medical attention for residents of the state who are unable to pay for hospital care.

In the June number of the *Svenska Lakarsallskapets Handlingar*, published in Stockholm, the medal presented to Professor Allvar Gullstrand on his sixtieth birthday, by the Swedish Medical Association is reproduced, and the list of his works is given. A German translation of his long article on the simultaneous determination of refraction and visual acuity opens this issue of the *Handlingar*. A German translation is given also of his report of a case of keratoconus with pulsation in the cornea. Gullstrand was awarded the Nobel prize in medicine in 1911 for his contributions to ophthalmology, especially his form of slit lamp.

Dr. Uhls, who worked with the American Relief Commission in Armenia, just returned, says that this famine and terror stricken country is threatened with a new peril, trachoma, which is spreading so that all the population is endangered. In some villages all the inhabitants are suffering. Medical men are scarce and medicines to be had are in towns, in some cases hundreds of miles away. The position is desperate; the people have been undernourished for several years, and therefore their resistance is lowered. If more assistance does not come, in a few years all the population of Armenia will become blind.

Our French exchanges mention that the recent annual congress in France for the amelioration of the condition of the blind unanimously voted in favor of the Cantonnet-Nouet system of writing as a means of communication between the blind and the seeing. A resolution was adopted urging that this system be taught in the schools for the blind in addition to the Braille system. Cantonnet gives a fully illustrated description of his method in the Journal des Practiciens, 1922, v. 36, p. 520. It is printed like the Braille, with a punch, but the holes are made to correspond to the outlines of the letters, so that the words can be read at a glance. It does not take the place of the Braille, but supplements it for those who do not understand the Braille. J. A. M. A., 1922, v. 79, p. 977.

The Eyesight Conservation Council of America has elected a number of prominent educators to the board of councilors, following a recent visit of Dr. John J. Tigert, U. S. Commissioner of Education to Columbia University, where classes in eye conservation are being held this year for the first time. It is also establishing a special mailing list for lecturers and writers interested in the subject of vision. Data and material will be prepared and issued periodically to persons whose names are on the special mailing list. There is need for lecturers who will appear before local organizations, such as Rotarian and Kiwanis Clubs, chambers of commerce, schools and colleges, to present the subject of conservation of vision. The council states that in an examination of more than ten thousand employees in factories and commercial houses, 53 percent. were found with uncorrected faulty vision. In one manufacturing establishment, over 70 per cent. were found with eye defects. As an example of inefficiency and resulting waste, 20 percent. of the inspectors in a large factory were found to be unable to see sufficiently well to detect defects in the product they were inspecting. There are 42,000,000 gainfully employed in the United States, and over 25,000,000 handicapped by defective vision or eyestrain.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

Alger, E. M. Value of Wassermann Test. (dis.) Arch. of Ophth. 1922, v. 51, p. 498.

Brown, E. J. Combined Perimeter and Scotometer. (3 ill.) A. J. O., 1922, v. 5, pp. 724-726.

Perimeter of Variable Radius. A. J. O. 1922, v. 5, p. 768.

Cohen, M. Morton Electric Hand Ophthalmoscope. Arch. of Ophth. 1922, v. 51, p. 509.

Coleman, W. Value of Wassermann Test. Arch. of Ophth. 1922, v. 51, p. 496.

Darlington, C. G. Value of Wassermann Test. Arch. of Ophth. 1922, v. 51, p. 493.

Duane, A. Simple Clinical Test for Light Sense. (dis.) Arch. of Ophth. 1922, v. 51, p. 503.

Eskuchen. Orbital Puncture, Comparison of Spinal and Orbital Fluids. Klin. Woch. 1922, v. 1, p. 1645.

Fordyce, J. A. Value of Wassermann Test. Arch. of Ophth. 1922, v. 51, p. 494.

Gallemaerts, E. Microscopic Examination of Living Eye. (dis.) Arch. of Ophth. 1922, v. 51, p. 501.

Gleichen, A. Criteria for Testing Visual Acuity. Arch. f. Augenh. 1922, v. 90, p. 211. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-145).

Gullstrand, A. Simultaneous Tests for Refraction and Visual Acuity. Sven. Lakar. Handl. 1922, v. 48, p. 53.

Malenowski. Ophthalmoscopy with Green Light Illumination. Polska. Gaz. Lek. 1922, v. 1, p. 475. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-135).

Pou, R. E. Value of Wassermann Test. Arch. of Ophth. 1922, v. 51, p. 497.

Schwenk, P. N. K. Flashlight Reflex of Macular Region. A. J. O., 1022, v. 5, p. 652.

Repeated Title. **Kraupa, E.** (A. J. O. 1922, v. 5, p. 690). Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-184).

THERAPEUTICS.

Addario, La Ferla. Injection of Sterilized Milk in Ocular Therapy. Arch. di Ottal., 1921, v. 28, pp. 204-213. Abst. A. J. O., 1922, v. 5, p. 684.

Bruno, D. Action of Iridal on Ocular Tissues. Gior. di Ocul., 1922, v. 3, p. 85. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-134).

Elschnig, A. Cocain-Alcohol Injection in Sphenopalatine Ganglion. Klin. M. f. Augenh., 1922, v. 68, pp. 295-300.

Goerlitz, M. Tuberculin in Eye Diseases. Klin. M. f. Augenh., 1922, v. 68, pp. 306-323.

Howe, L. Coefficient of Thermal Conductivity of Eye and Orbit. (dis.) J. A. M. A., 1922, v. 79, pp. 936-939.

Key, B. W. Protein Injections in Severe Ocular Infections. (dis. bibl.) Arch. of Ophth., 1922, v. 51, pp. 471-482.

Liebermann, L. Use of Rivanol in Ophthalmology. Budapesti Orv. Ujság., 1922, v. 20, p. 357. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-133).

Marin Amat, M. Injections of Sterilized Milk in Ocular and General Therapeutics. Siglo Med., 1922, v. 69, p. 571. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-107).

Oguchi, C. Osmotic Pressure of Eyedrops. Graefe's Arch. f. Ophth., 1922, v. 108, p. 363.

Rosenblatt, S. Thermal Eye Treatment. Ill. Med. Jour., 1922, v. 42, pp. 202-207.

Sanchez, R. M. Clinical Studies in Ocular Electrotherapy. Siglo Med., 1922, v. 69, p. 596. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-113).

Seidel, E. Experiments on Intraocular Lymph Flow, Mydriatics and Miotics. (1 ill.) Graefe's Arch. f. Ophth., 1922, v. 108, pp. 285-294.

Repeated titles. **Nowak, E.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-132). **Sgrosso, S.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-220).

OPERATIONS.

Prevedi, G. Changes in Cutaneous Flaps Inserted into Lower Conjunctival Sac During Plastic Operations. Gior. di Ocul., 1922, v. 3, p. 87. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-179).

Repeated title. **Merz-Weigandt, C.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-130).

PHYSIOLOGIC OPTICS.

Diaz-Caneja, E. Wheatstone's Stereoscopic Experiments. Arch. de Oft. Hisp.-Amer., 1922, v. 22, p. 297. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-142).

Gleichen, A. Vision with Indistinct Images. (1 ill.) Graefe's Arch. f. Ophth., 1922, v. 108, p. 398.

Lohmann, W. Optic and Tactile Estimations of Space in Localization of Peripheral Impressions. Arch. f. Augenh., 1922, v. 90, p. 235. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-121).

Ohrwall, H. Dispersion Illusions. Skandin. Arch. f. Physiol., 1922, v. 42, p. 104. Abst.

Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-122).

Pietrusky, F. Behavior of Eyes in Sleep. Klin. M. f. Augenh., 1922, v. 68, p. 355. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-6).

Swindle, P. F. Physiologic Explanation of Certain Optical Illusions. (10 ill.) Amer. Jour. Phys. Optics., 1922, v. 3, pp. 238-255.

Repeated title. **Werbitsky.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-136).

REFRACTION.

Agatston, S. A. Practical Suggestions on Refraction. A. J. O., 1922, v. 5, pp. 716-718.

Bernstein, E. J. Reflex Neuroses. (2 ill.) Med. Rev. of Rev., 1922, v. 28, p. 368.

Duane, A. Table Showing Accommodation at all Ages. (dis.) Arch. of Ophth., 1922, v. 51, p. 504.

Gamble, W. E. Weak Atropin Solution for Asthenopia. (dis.) A. J. O., 1922, v. 5, p. 659.

Ishiwara. Acuteness of Vision in Myopia. Nippon Gank. Zasshi, 1921, July.

Ishizu. Traumatic Myopia. Nippon Gank. Zasshi, 1921, July.

Olsho, S. L. Trial Frames for Base Line Refraction. (4 ill.) A. J. O., 1922, v. 5, pp. 718-721.

Shima. Traumatic Myopia. Nippon Gank. Zasshi, 1921, July.

Sumner, P. Remarks on Refraction. A. J. O., 1922, v. 5, pp. 712-715.

Takahashi. Relative Range of Accommodation. Nippon Gank. Zasshi, 1921, Nov.-Dec.

Weckert. Three-Grooved Trial Frames. Klin. M. f. Augenh., 1922, v. 68, p. 638. Abst. Internatl. Med. and Surg. Survey, v. 4 (8a-146).

Young, H. B. Spectacles Versus Eyeglasses. A. J. O., 1922, v. 5, p. 683.

Repeated titles. **Jablonski, W.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-149). **Levinsohn, G.** (A. J. O., 1922, v. 5, p. 690.) Internatl. Med. and Surg. Survey, 1922, v. 4 (8a-148).

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OPAQUE CANAL OF CLOQUET WITH PERSISTENT HYALOID ARTERY
(SCARLETT'S CASE)

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OPAQUE CANAL OF CLOQUET WITH PERSISTENT HYALOID ARTERY.

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PHILADELPHIA.

The facts of anatomy and embryology bearing upon such anomalies are reviewed. DeBeck's classification is given. A case is reported in which vision of the eye in question was light perception. There was an opaque canal of Cloquet, persistent hyaloid artery and also adventitious vessels on the surface of the canal. Illustrated by Plate 10.

Remnants of the hyaloid artery are among the most commonly observed anomalies of the vitreous, and usually are of little pathologic significance.

Meisner in 1855 first described a strand 3 mm. long, projecting from the optic disc, as the remains of the hyaloid artery. Independently, H. Muller in 1856 found a similar strand as a constant condition in oxen, and predicted that it would soon be discovered in the human eye. Saemisch and Zehender described it in man in 1863.

Anatomically, the hyaloid artery is a fetal structure, springing from the central artery, and passing thru the vitreous in the third or fourth month to the posterior surface of the lens, where it breaks up into numerous branches, forming the posterior lental plexus or vascular sheath. It is not accompanied by a vein.

By the end of the 5th and the beginning of the 6th month, the artery is surrounded by a distinct cellular sheath, lying in a space lined by a definite hyalin membrane, the Canal of Cloquet. Toward the anterior end, this cellular sheath disappears, leaving the artery to lie alone in the hyaloid space. By the end of fetal life, the entire vitreous lental system disappears.

According to Parsons,[1] where the artery persists there are numerous variations such as, (1) a small tag attached to the disc; (2) the entire artery associated with a posterior polar cataract; (3) the division of the artery in its middle, leaving the anterior and posterior parts to flap in the vitreous; (4) a posterior polar cataract, with or without a tag of tissue attached.

DeBeck,[2] in his comprehensive monograph on "Persistent Remains of the Fetal Hyaloid Artery", divides them into twelve different groups as follows:

(1) Shreds of tissue on the optic disc.

(2) Membranes on the disc.

(3) Cystic remains on the disc.

(4) Masses of connective tissue on the disc.

(5) Rudimentary strand attached to the disc.

(6) Strand attached to the disc, and a vestige also at the posterior surface of the lens.

(7) Strand passing from the disc to the lens.

(8) Similar strand containing blood (subgroup).

(9) Strand attached to the lens alone.

(10) Posterior capsular cataract.

(11) Striae on the posterior lens capsule.

(12) Persistent canal (without any remnant of the vessel).

The remnant may appear as a bluish white delicate cord of fibrous tissue, or it may contain a small vessel with blood, or the cord may be larger with new adventitious vessels on its surface. Some consider these as the remnants of the Canal of Cloquet, but as that normally exists in a transparent state, some other factor must be involved. Stilling believes the sheath enveloping the hyaloid artery remains as an open

tubular canal after the vessel has disappeared.

The artery is differentiated from the canal by some, because it possesses the caliber of a vessel, while the latter is larger, stalk like, and ends in a bulbous formation.

Concomitant anomalies are common, among which may be named colobomas of the iris, lens, choroid, disc and macula, aniridia, persistent pupillary membrane, congenital cataract, as well as posterior and anterior lenticonus and choroiditis, probably congenital in origin, which is a frequent complication. Large masses of connective tissue on the disc and extending on to the retina are frequently observed. These are probably inflammatory or hemorrhagic in origin. Cyst formations, pearly gray in color, and of varied form have been observed on the disc.

Case History—Miss M. B., age 21. Came because of poor vision in her right eye, which had existed as long as she could remember. Previous and family history negative.

O.D.V. = light perception. O.S.V. = 6/6. External examination negative.

Ophthalmoscopy—In the right eye there is a light bluish gray stalk, about 1/2 the size of the disc and attached to it, which proceeds forward into the vitreous, ending in a bulbous mass just posterior and to the temporal side of the lens. It does not float about with the movement of the eye.

Coursing thru this stalk is a blood vessel coming from the disc, and containing blood, while several small adventitious vessels may be seen on the surface. There is no vein present. By pressure on the eyeball, the current in the central vessel can be interrupted to a more or less degree.

As the connective tissue of the stalk covers so much of the disc, it is impossible to say exactly how the vessel within the stalk takes its origin, whether from the central artery or from one of its branches on the disc, altho from its position and direction it would seem to spring from the former. The vessels on the surface of the stalk rise from branches of the central artery on the disc.

About two d.d. to the nasal side of the disc is a large irregularly shaped white mass, with long arms projecting into the vitreous, resembling a patch of proliferating retinitis. Several areas of choroidal pigment disturbance are discerned in the neighborhood of the stalk, and thruout the fundus.

The majority of cases of fetal hyaloid structure reported have referred simply to the remains of the hyaloid artery not containing blood, and without special reference to the canal of Cloquet, while those of the latter that are recorded make little or no mention of vessels carrying blood, altho Collins[3] gives as one of the possible anomalies, a central artery persistent thruout its entire length, and Parsons[4] describes in the pathology of the vitreous a tube with a vessel within the lumen, and adventitious vessels on the surface.

Collins[5] reported a case with a grayish white mass in the pupillary area resembling glioma, for which the eye was enucleated. Examination showed it to be a whitish mass posterior to the lens, from which a slender cord extended to the disc. Microscopy revealed blood cells within the lumen.

Despagnet[6] described a case showing a grayish white tube extending from the lens to the disc, but with no vessels either within or on its surface. He designated it as a "Persistent Canal of Cloquet."

Fuchs[7] refers to a small filament attached to the central artery as a means by which the remnants of the hyaloid structure may be differentiated from a pathologic condition of the vitreous, which may resemble it. Instead of a filament, a tube may be present.

Galezowski[8] says he has seen a case of persistence of the artery and vein, while Parsons claims the vein is never present.

Von der Heydt[9] has observed with the Gullstrand slit lamp and the binocular microscope, a filament or spiral attached to the posterior capsule, somewhat down and nasally, in the postlental space. This he regards as a remnant of the hyaloid artery, and thinks it is evidence of the fact that the whole of the vitreous lental systhem is not

absorbed at birth. He believes this filament is present in most eyes.

The last subdivisio of DeBeck's classification of cases more nearly resembles mine, with the exception that these cases do not contain vessels.

He says that in almost all cases of persistent canal, it is found in both eyes, while in the ordinary forms of persistent artery, the remnant occurs in but one eye in more than 5/6 of the cases.

The case here presented is of interest, as the accompanying illustration shows because of:

(1) The unusual caliber of the Canal of Cloquet and its opaqueness thruout its entire length.

(2) The persistence of the hyaloid artery, carrying blood, within the canal.

(3) The clear distinction of the adventitious vessels on the surface of the canal.

(4) The reduction of vision to light perception.

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CLINICAL OBSERVATIONS ON THE CORNEA.

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With improved illumination, the corneal microscope permits exact observations of the changes in the anterior segment of the eye, which throw light on the nature and progress of such changes. Deposits on the posterior surface of the cornea, keratoconus, copper embedded in the cornea without irritation, corneal changes in electric ophthalmia and herpes are here described.

PRECIPITATES ON THE POSTERIOR SURFACE OF THE CORNEA.

The phenomenon of what are apparently minute droplets deposited on the posterior surface of the cornea is an early sign of iridocyclitis, and may be the only evidence of the incipiency of pathology. In certain cases of ocular pathology, not as yet definitely classified, similar droplets have been identified by Vogt as being edematous endothelial cells, and this observation has been later confirmed by Staehli. Aside from these "droplets" and probably individual cells, some pigmented, and pigment granules, the latter likely an evidence of senile depigmentation of the uvea, we find the larger cell conglomerations, the socalled mutton tallow spots on the posterior surface of the cornea in iridocyclitis.

The configuration assumed by these deposits, as seen in focal illumination, by means of the ophthalmoscope, is well known. As to their genesis, there may be some doubt. However, the theory advanced by Fuchs, that they are in all likelihood leucocytes, which have united to form smooth, round masses within the aqueous, has thus far not been successfully disproven by observation of the living eye with the microscope. Koeppe has claimed that if this form of origin be true, such "balls" must be found elsewhere on the iris or free within the aqueous. While he does not deny having seen similar masses, he feels inclined to believe that such as are seen on the posterior corneal surface are due to a successive apposition of individual cells and small cell masses.

Observation of many cases under high power leaves little doubt in my mind that they are deposited as one mass, and do not grow larger.

The following factors point to this, in agreement with Fuchs. The cell masses at the time of precipitation are apparently quite soft in consistency, for they spread out, are flat and regular in outline. This latter factor alone would exclude an accretionary development.

These masses of leucocytes, with apparently so much affinity for one another when forming within the aqueous, seemingly lose this cohesive desire when attached to the cornea, for tho we may observe enormous numbers develop in a very short time, yet these mutton tallow spots never seem to be even in part superimposed. They are individual, do not increase in size, tho a new group may make a very sudden appearance at any time in the process of the disease.

Newer observations pertaining to the (in all probability) senile process of depigmentation within the anterior chamber, may give food for thought as to the distribution of pigment in the deposits on the posterior corneal surface. It is a matter of frequent observation, that fresh exudates on the anterior lens capsule are almost immediately covered by a chocolate like pigment coating. These fresh exudative masses, when impregnated by pigment cells, seem to stimulate the latter into very active proliferation. I have seen large areas of exudate fully covered by new pigment over night. The impregnation may be by direct contact with the retinal pigment of the iris, or as likely by pigment free within the aqueous,—thus accounting for the pigmentation of isolated masses in the center of the pupillary area. It may be of interest to mention in this connection, that I have observed similar pigmented masses attached to the *posterior lens capsule* in cases of cyclitis.

The mutton tallow spots on the back of the cornea would, by their coloration in the majority of cases, present an absence of contact with pigment cells of any kind, unless their physical character were at times such as to exclude successful pigmentation. Some, however, are sparsely pigmented, especially in their centers, leading one to believe that this thicker center of the exudative mass may give a somewhat stunted nourishment to a few pigment cells after impregnation in situ, or they may, according to Fuchs, bring their pigment with them from their uveal origin.

In other cases, all deposits on the posterior corneal surface are covered by pigment, even on the attached surface. These masses may have been impregnated while in transit thru an aqueous containing free pigment cells.

In long quiescent cases of iridocyclitis, small star shaped masses, if on the posterior corneal surface, without a doubt represent old deposits to a great extent absorbed, in fact they may be permanent evidences of a former exudative process. These stars must not be confounded with similar, more uniform, pigmented three or four tailed pupillary membrane remnants, found so very frequently and often in great masses on the anterior lens capsule in normal eyes. It is well known that these acquire their pigment after birth. In this connection, it is of interest to know that I have found that these "stars" participate in the process of senile depigmentation; for if found in older individuals, they as a rule present a grayish appearance, a prima facie evidence of senile pigment absorption.

I have also observed pigmented masses, regularly deposited and round, on the posterior cornea in an old case of specific iridocyclitis, connected by a regular network of fibrin, individual strands between all deposits. At the time of observation, this network was not free within the aqueous, as is seen at times. I had opportunity to show this case to Prof. Gallemaerts of the University of Brussels, the first European authority on microscopy of the living eye to visit our country. We agreed that the picture presented could only be explained by accepting it as an evidence of "crystallization" in the process of absorption.

KERATOCONUS.

During the past two years, I have had an opportunity of studying seven cases of keratoconus under slit lamp illumination with the binocular microscope.

Two of these cases were fairly well

advanced, and showed the typical opacification and the most often vertical striping in the middle and deep corneal parenchyma. In both cases the normal nerve fibers were decidedly thickened.

The eye most advanced in this particular pathologic condition presented a rupture of Descemet's membrane.

The other cases presented keratoconus in its incipiency. One eye, tho the process was advanced to a point where it was possible to discern the conus macroscopically, when seen from the side, failed to show microscopic changes. In the four eyes of two other incipient cases, the most pronounced early change was the keratoconus ring of Fleischer, a curved line of pigment granules, supposedly of hematogenous origin, deposited in the basal epithelium. This line is similar in nature to the pigment line often found in corneal cicatrices, at times in normal corneae. This was first described by Staehli, who now believes that the coloration of the epithelium may have an extraocular origin, possibly from impurities in the lacrimal fluid.

COPPER IMBEDDED WITHIN THE CORNEAL STROMA.

A fifteen year old boy was injured as the result of a Fourth of July explosion. One eye was enucleated. The other has only the perception of light, This eye shows at least twenty-five particles of copper deeply imbedded within the cornea, all of which are metallically clean. Some were as large as one millimeter in diameter, thin and with their flat surfaces parallel to the surface of the cornea, for this reason having failed to penetrate. They all seemed to be retained without irritation of the surrounding stroma, and there was no ciliary injection one year after injury.

Several opacities, continuous thru the cornea, gave evidence of the perforation of other particles. A larger piece of copper was seen at the bottom of the anterior chamber. This had a piece of transparent lens capsule attached to it, the copper evidently having been freed from its original location in the lens capsule by a needling done for the traumatic cataract.

CORNEAL CHANGES IN ELECTRIC OPHTHALMIA.

In a patient whose eyes were exposed to a flash of a shortcircuit, high tension current, the cornea after twenty-four hours presented dew like changes of the epithelium, and many very minute epithelial cell erosions, which latter faintly stained with fluorescein.

The striking peculiarity of this case was the sharp demarkation of the involved corneal zone. Crescentic areas including about the lower one-fourth of both corneas, which no doubt at the time of the "flash" were covered by the lower eyelids, failed to show a pathologic condition. There were no visible retinal changes, both eyes presented a slight ciliary and conjunctival injection. The socalled photophobia, so often described in similar cases, was temporarily removed in this case by an instillation of cocain, proving that this symptom was in reality not retinal but due to a mild irritation of the traumatized corneal epithelium.

HERPES OF THE CORNEA.

A case of typical skin eruption, along the supraorbital and supratrochlear nerves, identified a coexisting keratitis on the same side as being of the same etiology, in this way giving an opportunity of observing a corneal lesion, without the question of diagnosis.

Macroscopically the cornea presented a fairly circumscribed, round area of grayish infiltration, involving about one-fifth of the cornea in an upper nasal zone. There was ciliary injection, epiphora, and a moderate amount of pain. Repeated inspection over a period of several weeks, showed no change. Deep vascularization, such as is so characteristic in specific parenchymatous keratitis, did not develop. The surface epithelium was stippled over this area and stained faintly in minute spots, showing epithelial cell erosions. Dew like changes of the epithelium were visible over the area involved, and extended somewhat into the more normal cornea. This remained stationary, therefore, a part of the lesion and not an evidence of progression. There were two elevated "humps" on the surface of the

cornea, presenting not a fluid accumulation as might be expected, but what must have been localized zones of edema of the corneal stroma, judging by their appearance, size, and behavior over a prolonged period of time. Over the back of the lesion, Descemet's membrane was thrown into broad folds. The endothelium covering the lesion was studded with at least fifty pigment cells or granules. This peculiarity has proven an endothelial change sufficient to allow of the adhesion of these granules posterior to the involved zone. Pigment granules were sparsely present on the back of the uninvolved corneal area, also in the other eye, thus proving that while they attached themselves in greater numbers on the pathologically changed endothelium, their presence in the aqueous had no relation to the corneal process, but was an evidence of senile *depigmentation* of the uvea of both eyes, coexisting in this individual.

TWO CASES OF RETINITIS PROLIFERANS OF SYPHILITIC AND DIABETIC ORIGIN.

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Although the two patients were examined repeatedly for a long time, large hemorrhages were never observed on the retina or in the vitreous. Therefore they are excluded as factors of the new formations. Read before the Rhode Island Ophthalmological and Otological Society, February, 1922.

Case 1. S. S., Armenian, 29 years of age, well nourished, strongly built, was seen the first time in July, 1913. In September, 1912, he contracted syphilis; four months later his eyes became affected and were treated at

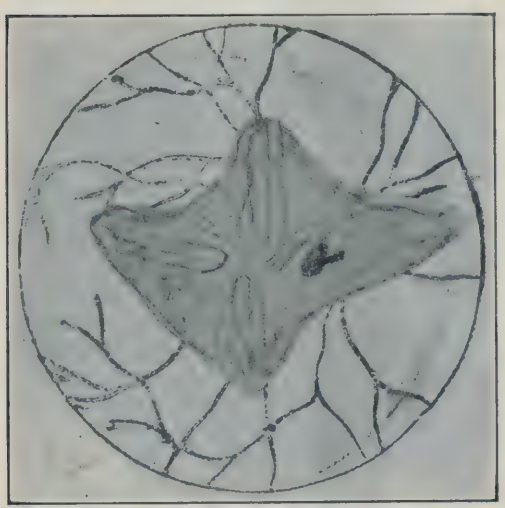

Fig. 1. Retinitis proliferans of syphilitic origin. (Case I).

the Massachusetts Eye and Ear Infirmary with injections, mercury, etc. Repeated examinations revealed the following eye conditions: Left eye. Pupil irregular, small, not dilatable, with deposits of pigment and exudates on the anterior capsule. Could not count fingers at any distance.

Right eye. External appearance normal, pupil dilatable with atropin, lens clear, vitreous transparent, optic disc entirely concealed by a large white membrane of an irregular rhomboidal shape. Two opposite angles were directed vertically and the other two horizontally. The one on the temporal side of the fundus deviated slightly upward, while the other, on the lower part, just a little outward. Numerous new formed fine blood vessels were seen on the surface, and one hemorrhagic spot. The retinal blood vessels were underneath the new formation, and were seen emerging at its boundary on the retina. The surface, with the numerous capillaries, protruded into the cavity of the vitreous, and became clear by direct ophthalmoscopic examination with +10 D.

The patient went to Philadelphia and other cities, remained in different hospitals for observation, was the subject of study and lectures, and returned here the following year, in 1914, totally blind. The vitreous grew gradually opaque, the fundus more and more indistinct, until all the interior of the eye became uniformly white.

Case 2. E. S., German, 56 years of age, considerably emaciated, pale, was seen the first time in July, 1921. Father died, according to the patient, of arteriosclerosis; mother of unknown disease, when he was a child. He has only one brother, who is 5 years older and is blind in one eye. About three years ago, sugar was found in his urine, and at the same time vision in the right eye began to fail. Patient has been under treatment ever since for diabetes, and at present he attends the Out Patient Department of the R. I. Hospital. Right eye: External appearance normal, pupil dilatable, anterior chamber of normal depth, lens clear, vitreous with fine floating opacities. The optic disc is concealed by a white mass, from which originate three strands. These extend onto the neighboring retina in three different directions, one upward and outward, another downward, the third, the shortest, toward the nasal side of the retina. This last one is composed of white bundles of delicate filaments, interlaced and curved at their ends, and not movable with the movements of the eyeball. The retinal blood vessels pass beneath the growth, which is best seen by the direct ophthalmoscopic examination with + 8 or + 10 D. In the macular region, several white spots are observed, grouped in a round area of a disc's diameter. Vision is reduced to counting fingers at two feet.

Left eye: The retina, when the patient was first examined, showed numerous white and hemorrhagic spots. But at present, the fundus has become totally indistinct from fixed opacities of the vitreous. Patient cannot count fingers at any distance.

According to Manz, who first described the affection in 1870, under the name of retinitis proliferans, the new formation of connective tissue is the consequence of an inflammation of the retina. Leber thought it to be due to extensive and recurrent hemorrhages in the retina and vitreous. The great majority of the writers who have reported other cases are of this opinion. Some believe that the coagulated blood becomes organized, others think that the blood, remaining for a long time unabsorbed, by its pressure produces either atrophy of the retina or proliferation of the connective tissue. Dr. Casali, of Florence, has observed that large coagula, which remain attached tenaciously for a long time to the walls of the retinal vessels near the disc, are those specially liable to be followed by the new formation. The connective tissue of the adventitia becomes active by the irritation of the extravasated

Fig. 2. Retinitis proliferans with diabetes. (Case II).

blood and proliferates, producing white masses, which conceal the optic disc and follow the direction of the blood vessels.

Hemorrhages in the retina and vitreous are of rather common occurrence, and they disappear rapidly or very slowly, without leaving traces of connective tissue proliferation. When this takes place, special conditions must exist, or agents unknown to us must act on the internal structure of the eye.

Cirincione has reported and described microscopically two cases of retinitis proliferans, and has come to the conclusion, that the new formation starts from the walls of the blood vessels near the disc, and that the hemorrhages which are frequently seen

are accidental and not the cause of the affection. He believes that the proliferation of the connective tissue from the adventitia is the consequence of the irritation, produced by chemical and toxic substances in the vitreous.

In both our cases, hemorrhages in the retina were insignificant, a rather small spot being present on the surface of the new formed membrane of the first and several round ones on the retina of the second, not dissimilar to those of an ordinary retinitis. None were observed in the vitreous, altho we had the opportunity to examine the patients repeatedly for a long period. This fact renders the two cases which we have reported very interesting, as it confirms the opinion of those writers who deny absolutely that hemorrhages precede and are the cause of the proliferation of the retina.

SOME FACTS ABOUT SALICYLAT THERAPY.

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OMAHA, NEBRASKA.

This paper summarizes observations bearing on the way in which salicylates, and drugs having similar effects, produce benefit in ocular inflammations. Practical points in the use of this class of drugs are given. It is based on work done in the Department of Ophthalmology of the University of Nebraska Medical College. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, July, 1922.

In spite of the undoubted value of the salicylates in ocular diseases, their use is still based on almost purely empiric grounds. Many theories have been proposed as to their mode of action, and some careful investigations have been carried out. While this work has not shown any one theory to be correct, it has incidentally brought to light some facts about the drug, which should not be without interest to clinicians.

In another paper[1], I have discussed these theories of the general action of the drug, but they may be briefly summarized here.

The first explanation that occurs is, that the drugs may be bactericidal in their effect, or inhibit bacterial growth. Sodium salicylat and acetylsalicylic acid, however, require concentrations of 1:250 or more to inhibit bacterial growth, and much greater concentrations to kill bacteria. Since these concentrations could never be obtained in the living body, it is evident that the effect of the drug is not directly bactericidal.

Salicylic acid inhibits growth at 1:1000 and kills bacteria at 1:300, but since it is a severe local irritant, it is not possible to secure such concentrations by giving the drug as such. It was supposed, however, by Binz[2] and others, that the free acid might be split off from its salts in the tissues; and especially in inflamed tissues where the CO_2 tension is abnormally high. Other work, however, by Feser and Friedberger[3], Hanzlik[4], and recently by Boots and Cullen[5], has shown that it is impossible to recover free salicylic acid from blood or any body tissues, whether inflamed or not, so that the free acid can play no part in any bacterial effect. Animal inoculation experiments have been no more successful. Work by Davis[6] and Boots and Swift[7] has shown no difference in the incidence of arthritis in inoculated animals with or without sodium salicylat, tho the latter workers found much clearer joint fluid in animals getting the drug. Infection occurred, but the reaction was much milder than in control animals.

Campbell[8] observed leucocytosis after the drugs, and ascribed their effects to this increase in the body's defenses. It seems to me, however, that the leucocytosis was due to the infection rather than the drug in his cases; since I have observed[9] cases of uveitis with blood counts before and after the drug was started, and noted no significant changes in the blood picture. Nor

was any change noted in the blood counts of animals getting the drug. So that it seems doubtful if leucocytosis plays any part in the action of the salicylates. H. Gifford[10] believed Oltramare's theory to be the most acceptable. This assumed that the general vasodilatation caused by the drug produced a compensatory depletion of the previously engorged vessels in the inflamed part. As far as I know, there is little evidence for or against this, except the clinical fact that such general vasodilatation and local depletion does occur. A related explanation is that of Hanzlik[11] "that the benefit to the joints may possibly be attributed to the local circulatory effects, which facilitate the interchange of inflammatory products."

In using the salicylates, it is becoming generally recognized that large doses must be given to secure the desired effect. H. Gifford[12] was the first ophthalmologist to use anything like the present large doses in ocular affections, and his dosage for sodium salicylat, one grain per pound of body weight per day, has proven a convenient one to many clinicians.

One reason for the necessity of large doses is the rapidity with which the drugs are excreted by the kidneys. Salicyl is found in the urine within five to eight minutes after a dose by mouth. Hanzlik[13] has shown, that tho excretion continues for three to four days after a dose, the greater part is recovered in the first ten to twenty hours. Thus to produce any continued concentration in the blood or tissues, the doses must be large and frequent.

In considering the possible toxic effect of large doses, experimental work points to the kidneys as the organs most likely to suffer damage. Hanzlik[14] has shown that such doses produce severe nephritis, often fatal, in animals; and that ordinary therapeutic doses caused the almost constant appearance of casts, leucocytes and albumin in humans. No serious effects were observed, but the albuminuria persisted for some time in a few cases. I have seen rabbits, and especially cats, develop fatal nephritis from moderate doses. In spite of these findings, we have never seen a clinical case of human nephritis develop during salicylat therapy.

In some obstinate cases of uveitis, the congestion returns as soon as the drug is stopped, so that we often give sixty to ninety grains a day for periods of two to six months or even longer. One case of sympathetic ophthalmia has taken three hundred to four hundred grains of sodium salicylat per week for the past seven months, and is in perfect health. Another case of sympathetic ophthalmia developed scarlet fever, but the large doses were continued with no evident damage to the kidneys. Clinical experience, therefore, leads us to believe that these urinary changes, which are unquestionably found, if looked for, are temporary and usually of no consequence. It would seem prudent, however, to examine the urine of all cases before starting the drug, and if albumin is already present, to choose a drug less likely to harm the kidneys.

Clinicians still differ as to the use of sodium bicarbonat to prevent toxic symptoms. Ehrmann found that its only effect was to increase the rapidity with which the salicyl was eliminated, which would tend to lessen the effectiveness of the drug. Hanzlik found no such effect, nor any effect in lessening renal irritation. We have found it of no value in lessening gastric disturbances from sodium sayicylat, which is to be expected, as this is a neutral salt. Cincophen and acetylsalicylic acid, however, it probably helps convert to the less irritating salts. We do not use it with sodium salicylat, but do with cincophen.

As to the more generally known toxic symptoms, ringing in ears, slight nausea, and malaise occur fairly often, but are no indication for stopping the drug if it is still needed. Depressing effects on the heart may occur, but usually only with enormous doses, and their importance has been overemphasized, especially for aspirin, which is only slightly more toxic than sodium salicylat. I have never seen cardiac decompensation result from either

drug. Occasionally delirium follows large doses, and it may be alarming. Such cases are rare, however, and usually depend on contributing circumstances. They should be watched for, especially in extreme old age.

If vomiting occurs, rectal may be substituted for oral administration. Sixty grains of sodium salicylat may be given by high enema two to three times a day, and this is usually well absorbed. Recently, instead of this, I have been substituting cincophen or atophan for the salicylates. Cincophen, and its derivative, neocincophen, appear to offer almost perfect substitutes for the salicylates, where for any reason these cannot be given. Cincophen is phenyl cinchoninic acid. Atophan is the trade name originally applied to the same product, because of its supposed effect on gouty tophi. Neocincophen is the methyl derivative of cincophen. Chemically, these drugs are not very close to the salicylates, but pharmacologically their effects are almost identical. Hanzlik and Scott[15] have investigated the effects of these drugs in rheumatic fever. They found both as efficient as the salicylates in lowering fever and stopping pain, tho larger doses of neocincophen were required. The urinary changes after cincophen were much less marked than with the salicylates, and still less marked after neocincophen. Other toxic symptoms similar to those after the salicylates were observed, but these were seldom severe. Epigastric pain was a symptom peculiar to cincophen patients. Chace, Killian and Myers[16] found toxic symtoms much less marked than with the salicylates.

I can attest to the occurrence of epigastric pain after cincophen, tho it was never severe, and in my experience nausea has been much less frequent than with the salicylates, and vomiting has not occurred once. Patients whose stomachs will not tolerate salicylates, usually take cincophen with little or no discomfort. Besides this, I have seen a number of cases of iridocyclitis which failed to respond to large doses of sodium salicylates, but which cleared up promptly on cincophen. I am at present seeing two such cases, whose congestion returns in about forty-eight hours after cincophen is stopped, but disappears at once as soon as it is resumed in small doses. (30 grains a day.)

As to the dosage, Hanzlik gave 150 to 195 grains of cincophen, and 165 to 240 grains of neocincophen before results were obtained. Chace, Killian and Myers gave 50 to 100, and in one case 200 grains of neocincophen daily, without marked toxic symptoms. I start on 100 grains in severe cases, (80 in less severe) and cut down after two or three days to 80 and then 60 grains a day. It seems best, usually, to keep up doses of 30 to 45 grains a day for some time after the eye is quiet. The principal objection to these drugs is their price. Chiefly for this reason, sodium salicylat is usually used where it is well borne. If the usual one grain per pound per day is not effective, it should be pushed to 175 or 200 grains a day, and this will often bring a prompt response.

In using one of these drugs, in nearly all cases of nonspecific iritis, iridocyclitis, and optic neuritis, congestion after cataract extraction, and of course sympathetic ophthalmia, the causes of these conditions are not lost sight of, and are eliminated as soon as found. The drugs are of immense service in these cases, however, by lessening the reaction and preventing permanent inflammatory changes until the effect of causal treatment can be secured.

Some laboratory work undertaken this year is far from finished, and has proven nothing definite as to the action of the salicylates. It has, however, brought out some facts as to the occurrence of salicylat in the eyes, which I had not previously known. Whitham[17], in 1913, experimented on the occurrence of salicyl in the aqueous, after the injection of several salicylat derivatives. Tests for salicyl could be obtained in the aqueous of rabbits 4 to 6 hours after the drugs were given by mouth. The strongest tests were given with urotropinsalicylat after which formalin was also found in the aqueous. A slight increase in the amount of salicyl was

noted after hot packs were applied, more after a previous paracentesis, and a considerably greater increase after drops of 10 per cent dionin and subconjunctival injections of salt solutions. Aqueous obtained in one of these tests apparently inhibited the growth of pneumococci in the test tube. Whitham's estimations of the amount of salicyl were not quantitative but only comparative.

Working with the quantitative method of Hanzlik, I attempted to find whether any greater concentration of salicyl was present in an inflamed than in a normal eye, and whether free salicylic acid was present in either. Sodium salicylat was fed to rabbits and cats by stomach tube, and one eye was injected with a virulent culture of staphylococcus. The aqueous of each eye was tested from time to time, and finally the animals were sacrificed, each eye extracted and the salicyl estimated. The amounts present in the blood were also estimated at as nearly as possible the time when the other specimens were obtained. No free salicylic acid was ever obtained from either inflamed or normal eyes. No greater concentration of salicyl was found in the inflamed than in the normal eyes. In fact, in the few experiments which were completed, the reverse was true.

It was interesting to know the rapidity with which salicyl appeared in the aqueous after a dose of sodium salicylat by stomach tube. It was detected once in twenty-five minutes and usually in thirty-five to forty-five minutes. After forty minutes, enough was usually present to be estimated quantitatively. No important differences were noted in this respect between cats and rabbits. After a dose of 15 grains to a rabbit, salicyl could be detected in the aqueous after twenty hours, but not after twenty-four hours.

In two animals, the various parts of the eye were separated, weighed, and extracted separately. In both cases, most of the salicyl was found in the aqueous and vitreous, there being none in the lens, and only a small amount in the uveal tract and in the corneoscleral coat. Concentration in the aqueous and vitreous were about the same. In one human case, getting ordinary doses of sodium salicylat, I obtained a very strong test for salicyl with the aqueous. In another case, tests were negative on two occasions.

In animals, the concentration in the aqueous, after repeated doses, reached 1:3600 to 1:1250. In the whole eye by weight, it reached 1:5900 to 1:4100. In the one rabbit whose aqueous showed salicyl in a strength of 1:1250, the concentration in the pericardial fluid was 1:5000, while it was only 1:17,500 in the blood. In four other rabbits and one cat, there was also noted a greater concentration in the aqueous than in the blood, and in two of these, the difference was very marked. These results were unexpected and are not in agreement with the work of others on joint fluid. But an accumulation of the drug in a relatively stagnant serous cavity from the circulating blood, is not unthinkable. (I would like to have the opinion of someone who knows all about the physiology of the intraocular fluids as to this possibility.)

It was found that the method used for extracting salicyl from such small amounts of blood and tissues involved considerable loss, and Dr. A. L. Rubnitz and I are now working out what we hope may be a more accurate method. Such large differences as were observed in a few cases, however, can hardly be ascribed to the method. And the fact that such concentrations of salicyl can be obtained in the eye, even if they can never be bactericidal, may help to make more intelligible whatever effect the drugs do have. From present indications, it would seem that their action will be found to involve some of the intimate facts of metabolism, altho their vasomotor effect is also to be remembered. In any event, the salicylates, together with cincophen and neocincophen, are practically unique in their effect on local inflammation, so that they may be called the antiphlogistic drugs par excellence.

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OCULAR MANIFESTATIONS IN A CASE OF HYPOPHYSEAL SYPHILIS.

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In this case, with marked Fröhlich's syndrome and abnormal sugar tolerance, there was marked choking of the discs and contraction of the visual fields. Wassermann reactions were negative, and no cause was discovered for the ocular condition. Decompression to save the sight showed no intracranial pressure. Prolonged thyroid and pituitary feeding were attended with improvement of vision. Fluid from the ventricles gave a Wassermann "4 plus". Antisyphilitic treatment was pushed, and brought the eyes to normal. Read before the American Ophthalmological Society, May 1922.

The clinical aspect of a case of hypophyseal disease with primary or neighborhood syphilitic manifestations is here reported, mainly on account of the comparative infrequency of the complication, and the difficulties encountered in arriving at a definite conclusion.

Cases of acquired or congenital syphilis of the hypophysis are mentioned in the literature of neurosurgery, and obviously most of those cases were found, or at least the clinical diagnosis confirmed, by autopsy. De Schweinitz's recent article upon a similar topic reports much of the recent literature, to which the reader is referred.

History. An unmarried woman, age 24, was first seen April, 1921, with defective vision as the principal complaint, which dated back about two months. There were other important points in the history, which should be here recorded: (1) an increase of weight, that is a gain from 190 pounds at the age of 18, to the present weight of 255 pounds; (2) polyuria, as long as she could remember; (3) polydipsia since childhood; (4) bitemporal headaches; (5) irregular and scant menstruation for five years, at which time she began to put on excessive weight; and (6) anaphrodisia.

The other important extracts from the history are taken from the careful notes made by Doctor Chas. E. Dowman and Doctor J. E. Paullin, consultants in the case.

Family history was negative for tuberculosis, cancer and neurologic diseases. The father, mother and five brothers were living and well. Two children died in infancy. The mother miscarried at a four months' pregnancy.

Except for diseases of childhood, the patient's health was always good. There was a history of scarlet fever, complicated with a right otitis media, which permanently impaired the hearing. Five years ago she had fainting

spells, and in one attack she was unconscious many hours. About this time she was knocked down by a train, but there was no head injury or unconsciousness. She finished high school at 16 years, since which time she has worked with her father in a railroad ticket office.

Physical Examination. The patient was a very stout young woman. There was an abundance of subcutaneous fat about the arms, neck, chest, legs and abdomen. The skin was dry and coarse. There was an absence of hair in the axillæ, but a good supply on the head and pubis. The hands were large, the fingers tapered, and there were large crescents on the nails. The teeth were good, with marked spacing between the two upper middle incisors.

The cranial nerves were normal except the optic (see eye examination). There was no disturbance in the functions of the cerebrum or cerebellum, and all reflexes, both superficial and deep, were negative. The thyroid gland was not palpable. The heart and lungs were normal. The blood pressure was 134.

The urine was negative. The blood was normal. The blood and spinal Wassermanns were negative. The blood sugar response after the administraton of 125 grams of glucose was as follows:

Fasting blood sugar.....	0.140%
1/2 hour after glucose.....	0.210%
1 hour after glucose.....	0.220%
1 1/2 hours after glucose.....	0.220%
2 hours after glucose.....	0.180%
2 1/2 hours after glucose.....	0.160%

The urine voided one hour afterward contained a faint trace of sugar, and the urine voided 1 1/2 hours afterward contained a faint trace of sugar. All other specimens were negative. (Paullin.)

The nose and sinuses were negative for infections. The right ear drum was contracted, and scar tissue was present. The tonsils had been cleanly removed. An X-ray examination showed a box shaped sella, measuring 14x14x14 mm., with apparently no bone erosion.

Eye Examination. Vision right 20/50, left 20/40, unimproved. The external appearance of the eyes was normal; the motility was good and there was no diplopia. The pupils were of normal size, and reacted normally to the usual stimuli. The media were clear. The right disc showed a swelling of 5 D.; there were a few splotches of retinal hemorrhages above the disc, and a few yellowish dots arranged in radiating lines in the macular region. The veins were greatly engorged and tortuous, while the arteries were of normal size. The choroid and retina did not show any abnormal pigmentation suggestive of congenital syphilis.

The left disc was likewise swollen, measuring 3 D., and the veins were engorged. The retina was free of hemorrhages, exudates or pigmentation.

The fields showed marked peripheral contraction for form, within 20 degrees, with central relative scotomata for colors. (See Fig. 1.) The blind spots were slightly enlarged.

Course. It was agreed that there was definite clinical evidence of an hypophyseal disturbance (dystrophia adiposa genitalis) without hemianopsia, and on account of the choked discs, a subtemporal decompression was at least advisable to preserve vision. This operation was performed April 19, 1920, by Dr. D. under local anesthesia, without discomfort to the patient. The brain was not unduly tense, and there was nothing unusual in the exposed area. A small amount of fluid from the right ventricle was withdrawn under no pressure. The fluid showed a slight increase in globulin, with a cell count of 140 per cubic mm. A specimen for a Wassermann was lost.

Recovery from the operation was prompt, and vision improved, but the bitemporal headaches persisted. Glandular feeding (alternate doses of thyroid and pituitary gland) was given for two months, at the end of which time no change was noted in her symptoms, except the continued improvement in vision, fields and the appearance of the disc. In September, a

mild attack of plastic iritis developed in the right eye, which was treated locally in the usual way, with the addition of the iodides internally and mercurial rubs. In two weeks all symptoms had subsided. The papill-edema had subsided considerably, but the spoke like exudates in the macular region of the right eye had increased to a full star, and the left eye was now similarly affected.

Cerebral syphilis, until the attack of iritis, had not been suspected on account of negative Wassermanns, but with this recent information at hand, a final opinion was expressed that there was a probable syphilitic lesion involving the hypophysis, and accordingly appropriate treatment was pushed to toleration, including four injections of salvarsan. Within a reasonable time the headache subsided, there

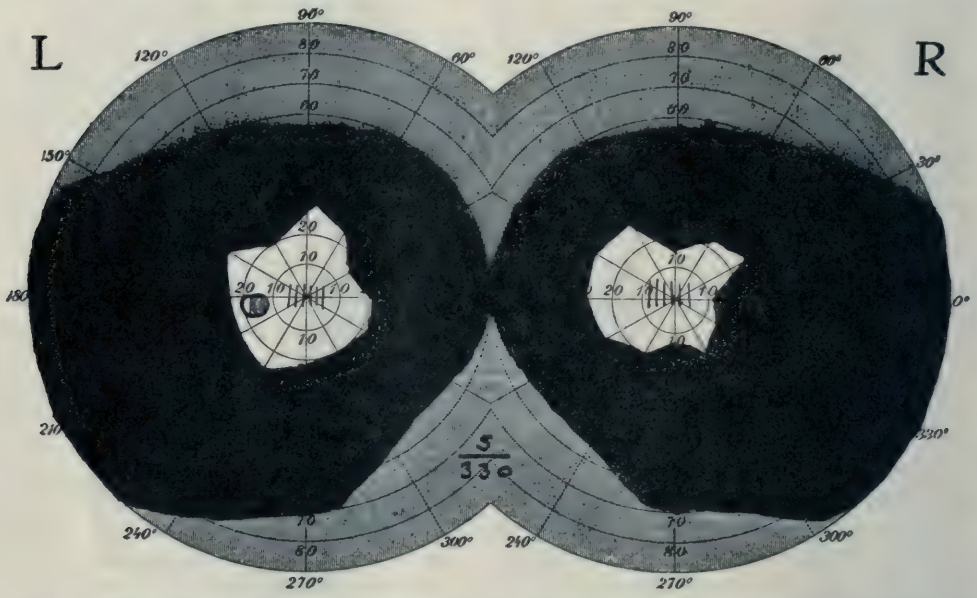

Fig. 1. Fields showing marked peripheral contraction for form, central relative scotoma for colors and a slightly enlarged blind spot in the left eye.

In as much as there had been no material benefit or improvement in her condition, with the exception of vision (and there still remained a considerable swelling of both dicsc), the patient was advised to return to the hospital for another general and neurologic examination, including a vestibular stimulation. No new evidence was thereby gained. To definitely exclude a cerebral tumor, 35 cc. of ventricular fluid was drawn from the right ventricle under fair pressure, and 30 cc. of air replaced. A ventriculography failed to show any filling defect of any of the ventricles in any position. From this study, a cerebral tumor was excluded. This ventricular fluid showed a Wassermann ++++, normal globulin, no glucose reduction and a normal cell count.

was a decided reduction in weight, and the vision and fundus picture had returned to normal, except for some tissue changes in the disc which one would expect in prolonged edema.

The patient has been seen at intervals, even recently, and her condition is excellent, in that she is free of headaches and the eyes are normal; but the polyuria persists and the menses are still scant and most irregular, and her weight has increased to 261 pounds.

Comment. It is manifestly a matter of diagnostic speculation to definitely describe and locate the lesion which would have produced the chain of symptoms, including the eye complications. But in reviewing the history, one must be impressed with three outstanding facts: (1) an acute condition within the skull, made known by cer-

tain optic nerve changes indicative of intracranial pressure; (2) a chronic process or an impaired function of the hypophysis, evidenced by objective signs and a fairly typical history of hypopituitarism; (3) laboratory evidence and a clinical sign (iritis) of syphilis.

On account of the prominent feature of an hypophyseal disturbance, it was only natural to associate the cause of the papilledema with some lesion within proximity to that gland, and as facts developed, that lesion unquestionably was syphilitic. I know of no means to decide whether this infection was congenital or acquired. There were no congenital stigmata, including the absence of chorioretinal changes frequently seen in congenital syphilis, and if the infection was acquired, it probably was extragenitally contracted in childhood.

In the establishment of a diagnosis then, two working hypotheses may be considered; (1) that the pituitary gland was primarily syphilitic, and the acute symptoms were manifestations of a breaking down or gummatous process; (2) the gland already in a state of hypofunction, was secondarily involved by a localized exudation, with the formation of neighborhood gummy tumors, or as Starr expresses it, "a chronic syphilitic hyperplastic inflammation with cellular infiltration of the meninges."

In favor of the idea of a primary glandular involvement, to which I am inclined, one could readily assume that the growth, having reached large proportions from a "breaking down process," blocked the foramina of Monroe, and the distended lateral ventricles, with choked discs as a sign of increased cerebral pressure, were natural consequences.

Cushing[2] mentions a case diagnosed clinically as cerebral syphilis, with polyuria and polydipsia as prominent symptoms, which improved under the iodides. The same author likewise reports another instructive case of unsuspected gumma of the hypophysis found by autopsy, with glycosuria and polyuria and early choked disc as the prominent symptoms.

The abnormal sugar tolerance of this case, while unusual for true types of hypopituitary disorders, is not at variance with the diagnosis, according to the following explanation and opinion of Dr. Paullin:

"The patient very definitely shows an abnormal tolerance for glucose; and perhaps an abnormal carbohydrate metabolism. While it is not suggestive of a pituitary disorder, at the same time it is not completely negative evidence that such a disorder does exist. It is entirely possible that the pituitary disease having existed for the length of time that it has, has caused other glands to furnish evidence of disordered secretion, and this perhaps is the reason why we have in this patient an abnormal curve, such as is exhibited. I believe that there is not only a disorder of the pituitary, but also of the thyroid and perhaps the ovary as well."

One would hardly expect the complete disappearance of those symptoms comprising Fröhlich's syndrome, which were caused by structural changes of many years duration within the hypophysis, and which alteration, as has been intimated, affected many of the other ductless glands of the body.

[The patient has developed (June 5, 1922) a second attack of low grade serous cyclitis in the right eye. Under rigid antiluetic treatment it rapidly cleared. There have also been several fainting spells; but aside from these complications, there has been no definite change in the general symptoms.]

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2. Cushing. Pituitary Body Disorders, p. 233.

HYPOPHYSEAL DISEASE PROBABLY OF SYPHILITIC ORIGIN.

BEN WITT KEY, M.D., F.A.C.S.

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The case here reported gave a negative history and repeatedly negative Wassermann reactions, but showed striking improvement on antiluetic treatment. During its course, it showed increasing evidence of hypophyseal disease. Read before the American Ophthalmological Society, May, 1922.

The ever doubtful diagnosis of intracranial disease, and yet often too certain conclusions arrived at thru clinical and laboratory tests, furnishes always a fascinating study to those interested in differential diagnosis, and in ferreting out important data relating to an individual case. With this in mind, but especially because it presents certain important studies just now being entered upon by numerous observers in other and broader channels of research than ours, I beg leave to relate the following case report:

G. T., (Hosp. No. 30863), aged 19, came to the clinic of Dr. W. E. Lambert, New York Eye and Ear Infirmary, August 16th, 1920, complaining of diplopia, left convergence, greatly reduced vision in the left eye, intense constant headache, and nausea with frequent vomiting.

Present Illness.—Two months prior to admission he had noted diplopia from time to time, coming on with headache, dizziness and nausea, and vision cloudy, especially in the left eye. These attacks, which at first he regarded as "bilious," had become more frequent, when about two weeks before, nausea was persistent, headache and dizziness gradually becoming constant, progressing to such severity, that together with marked diplopia and loss of vision especially in the left eye, he was rendered incapable of work. He had lost no weight, in fact had been in excellent health, was not sure but that he had gained in weight recently. His appetite had been good, but the nausea and headache led him to believe that his stomach was at fault, and he had therefore sought aid at the hands of his family physician. Other symptoms indicating cardiac, kidney or pulmonary disturbance had not been present.

His mother had noted that he had become very drowsy at times, especially during the past two weeks, sleeping for short periods during the day, awaking with intense headache and dizziness, and apparently not refreshed, would sleep only at intervals during the night. When awake he appeared "stupid" or "exhausted" at times, she did not know which, but certainly he was entirely unlike himself. During the past two days, he had suffered unbearable pain.

Previous History.—The patient has always been strong and well, severe type of measles when ten years of age being the only illness of childhood. He denies gonorrhea and syphilis, insisting he has never had a chancre or "sore" of any kind, the only skin eruption being that of measles nine years before, at which time he was very ill and received fairly prolonged treatment. He has been a steam mechanic by trade for past four years. Married five months before. He has not used alcohol; has indulged in tobacco but very moderately; tea and coffee not to excess. His father and mother are living and well, one sister eighteen years old in good health. No family medical history of any importance.

Physical Examination.—The patient appeared in excellent physical condition, color good, no excess fat, but strong and muscular in build, well proportioned, and weighing 176 lbs., 5 ft. 11 3/4 inches tall; skin normally warm and moist, normal axillary and pubic hair; genitalia normal; patella reflexes normal.

Ocular Examination.—Vision of the right eye = 20/30, unimproved; of the left eye = 10/200 (eccentric), unimproved. The refractive error was that of very moderate hypermetropia in each eye.

There was marked paralytic convergence of the left eye, measuring 25 degrees; outward motility limited but not entirely lost, five to ten degrees remaining. Vertical rotation was unaffected,

paralysis of the external rectus of the left eye being definitely present. Motility of the right eye was normal. There was no exophthalmos; no nystagmus.

The lids were normal; no conjunctival reaction; cornea normal; pupils slightly unequal, the right 3 1/2 mm., left 4 mm. and slightly oval in vertical meridian, both responding to light and convergence, the left not so promptly as the right.

The *ophthalmoscope* revealed in the right eye normally clear media, choking of the disc with an elevation of 6 diopters, the usual vessel changes of engorgement and tortuosity, only a few small feathery hemorrhages about the papilla, no splashes or drop like hemorrhages, no white spots, no pigmentation, no detectable macula change. The media of the left eye contained many fine dust like particles, the disc choked to an elevation of seven diopters, numerous small fresh retinal hemorrhages about the papilla, very moderate edema of the retina, the papillomacular region presenting several small exudative areas of deep involvement with a piling up of exudate, little or no pigment visible, giving the unmistakable picture of a typical retinochoroiditis of the low grade exudative type. No drop like hemorrhages, no extensive retinal splashes, no old or partly absorbed hemorrhagic areas, no pigmented spots. The retinochoroiditis appeared as tho it were separate and apart from the nerve involvement.

Fields of vision were found to be normal in the right eye for form and color, 10 degrees of concentric contraction in the left eye for form and color. Blind spots were enlarged, the left irregularly and larger than the right.

Further investigation led to the following reports: The urine was normal, except for a moderate indican reaction. Two blood Wassermann tests made in different laboratories were reported negative, with both alcohol and cholesterin antigen. No blood sugar tests were made at this time. X-ray examination, made August 17th, 1920, (day after admission to Infirmary), was reported by Dr. George Dixon as follows: "Large frontals, right larger than left and both cloudy; ethmoids cloudy, especially right side; antra clear; septum straight; sphenoid large and cloudy; sella about 157 sq. mm. (uncorrected); clinoids normal." The intranasal examination proved to be negative in every detail. He was referred for a neurologic examination, the report from which stated the diagnosis: "brain tumor, operation probably inadvisable."

With this data at hand, it was decided, in view of the negative intranasal examination, but in spite of the X-ray of cloudy sinuses and negative Wassermann report, to administer mixed treatment in large doses and to observe carefully the effect, repeated intranasal examination being made from time to time. In the course of four days, there was noticeable improvement; especially was the headache noticeably relieved. Mercury inunctions were then added to the treatment, and neoarsphenamine intravenously. At the end of ten days marked improvement was evident. At the end of two weeks, he was almost entirely free of headache, the abducens palsy had improved, and in another week there were very definite curative changes in the fundus picture of each eye. Since that time to the present date, this treatment has been continued—courses of mercurial inunctions, and potass. iodid, as have seemed fitting to saturation, Fowler's solution, and neoarsphenamine intravenously have been administered. The effect of the treatment was not only prompt, but it has been continuously effective.

At the end of five weeks' intensive treatment, both nerveheads receded to a marked degree, hemorrhages had absorbed, exudative retinochoroiditis had subsided, vision in right eye = 20/30, left eye = 20/70-1. He returned to his previous occupation during the month of October, 1920, (two months after his admission to the hospital), and has been at work quite regularly since that time. On one occasion he discontinued his treatment for a time, and there was an early return of that intolerable headache, dizziness and nausea, which, however, promptly responded to rigid treatment. Repeated blood Wassermann tests have been negative, and two spinal Wassermann tests revealed nothing positive. October 16th, 1920, (two months after his admission to hospital) his wife gave birth to a seven months baby, apparently in good health.

During the five months that followed,

he was reasonably free of symptoms, but it was observed that he was showing signs of excessive growth, his features, hands and feet were noticeably becoming larger, his arms longer, and his height rapidly increasing. These observations led to an X-ray examination on January 17th, 1921, which was reported as follows: "Sinuses as before stated in previous X-ray report, but now the sella is enlarged to 272 sq. mm. (uncorrected) with some erosion. Diagnosis—tumor of hypophysis." Further investigation revealed nothing new in the case.

A blood Wassermann test made by Dr. H. R. Geyelin at that time (May 4th, 1921) was negative both to alcohol and cholesterin antigen. The blood count was as follows:

HMB: 75% Talquist and Sahli.

RBC: 5,800,000.

WBC: 9,400.

Differential Count was unimportant.

Misc. Red blood cells morphologically normal, very slight central pallor.

Blood Sugar: before glucose, .135%.

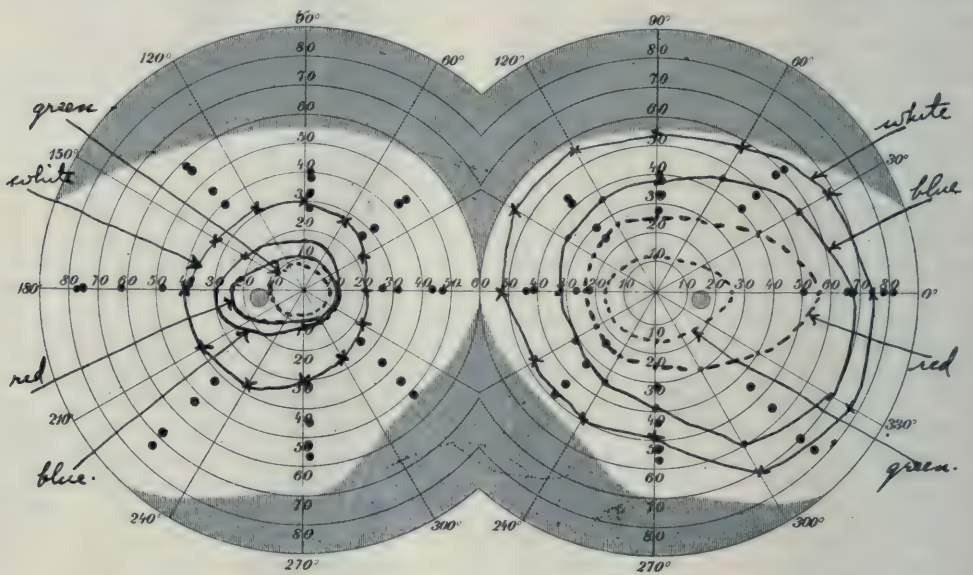

Fig. 1. Fields of vision April 15, 1921 showing contraction principally of the left.

In April, 1921, (8 months after his first appearance), he had grown 3 1/4 inches in height, now 6 feet 3 inches tall; his features, hands and feet greatly enlarged; his weight increased from 180 lbs. to 225 lbs. (gain of 45 lbs.); his mentality showed signs of waning intelligence, his memory slow and uncertain—typically acromegalic. Vision of the right eye = 20/30, of the left eye = 20/70-1. Fields of vision showed slight concentric contraction to form and color in the right eye, marked concentric contraction, 30 degrees to form and color, in the left eye, no sloping of form or color fields on the temporal side in either eye; as the charts presented indicate. Mariotte's blind spots were enlarged, as shown in the charts presented.

Blood Sugar: 1 hr. after glucose, .160%.

Blood Sugar: 2 hrs. after glucose, .140%.

Urine before glucose; Sugar, none; diacetic acid, none.

Urine 2 hrs. after glucose: Sugar: none; diacetic acid, none.

At the present time, one year since the above observations and tests were made (18 months since his admission to Infirmary), he is at work, he has grown an inch in height (now 6 feet 4 1/4 inches), and has gained 15 lbs. (now 240 lbs.). His memory is slow and uncertain. There is now a slight secondary divergence of the left eye, 10 degrees; pupils slightly oval, the left a trifle larger than the right; both respond very sluggishly to light, but fairly well to convergence. The fundus picture is that of secondary

atrophy, partial in the right, more advanced in the left, both discs entirely free of swelling and edema; the retinochoroiditis resolved, an irregular, moth eaten appearance in the macula region of the left eye. Vision of the right eye is 20/30-2; of the left eye 20/100. Fields of vision, April 25th, 1922, are similar to those found a year ago, except there is greater concentric contraction, the right contracted 15 to 30 degrees for form and color with some evidence of greater contraction for white on the temporal side, but no quadrant color anopsia; the left contracted to 10 degrees about the point of fixation, red and blue being maintained but green no longer detected, as the charts indicate. The blind spots are only slightly altered as compared with those delimited a year ago. No scotoma was found at any time.

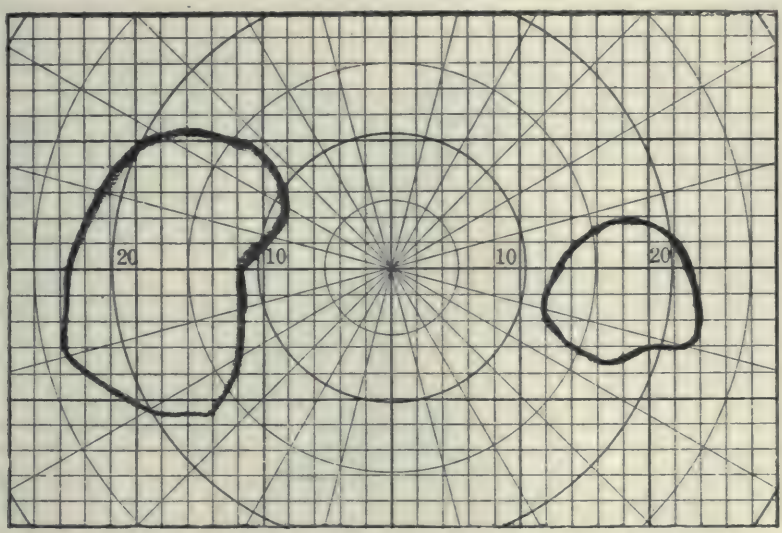

Fig. 2. Blind spots as taken April 20, 1921. Test object 1 cm. at 60 inches

X-ray examination (April 22nd, 1922) reveals the following: "Erosion of the sella evidently progressing. The greater portion of the dorsum posteriorly, beginning about the middle, has disappeared, and the posterior clinoids are also disappearing. The cavity measures at present 350 sq. mm., uncorrected. Diagnosis: tumor of the hypophysis."

Blood sugar tests at this time are very similar to those reported a year ago, indicating a very slightly low sugar tolerance.

For the past twenty months, he has been almost constantly under antisyphilitic treatment, no glandular therapy being attempted. During this time, he has taken 185 grs. of mercury; 18000 grs. of potass. iodid.; and 22 neoarsphenamine injections intravenously. His tolerance to mercury and K. I. was quite remarkable, large quantities being necessary to produce symptoms of saturation.

Comment.—It is hardly necessary to state, I think, that during the first few months of treatment and observation of this case, a positive diagnosis was made of syphiloma of pituitary. But in the face of an apparently negative history, persistently negative Wassermann tests, negative spinal fluid, the birth of a healthy child 7 months after marriage and two months after his admission to the hospital, with later development of acromegalic gigantism and X-ray findings of progressive enlargement of the sella, the following questions naturally arises: Is this a case of pituitary syphilis? If so, hereditary or acquired? If not, is the pituitary involvement secondary to a basilar syphilis, or may the whole picture be merely one of tumor (cyst or neoplasm) of the hypophysis with unusual symtomatology? Further differential diagnosis than this does not appear reasonable at this time.

There is no evidence in the history to indicate acquired syphilis, unless perhaps the socalled unusual attack of measles nine years previously may be significant

in this regard, but which of itself can not be relied upon for positive diagnostic purpose. Furthermore, syphilis of the gland is uncommon in acquired lues. Henschae and Nager mention only one case of acromegaly from this type of pituitary disease. Cushing relates a case, No. XLVII of his series reported in 1912, of syphiloma of the hypophysis with glycosuria and polyuria, diagnosed as diabetes mellitus, occurring in a man 32 years of age, whose history and symptoms are almost precisely those

On the other hand can tumors of the gland, regardless of lues, be held accountable for the symptoms and progress of this case? Certainly the character of the symptoms, the choked disc, the X-ray findings, the negative Wassermann and spinal fluid, all would indicate such a diagnosis. But on the contrary, it does not explain the retinochoroiditis, external rectus palsy (uncommon in pituitary tumor), early lethargy (almost pathognomonic in syphilis of the pituitary according to Walter Timme), the

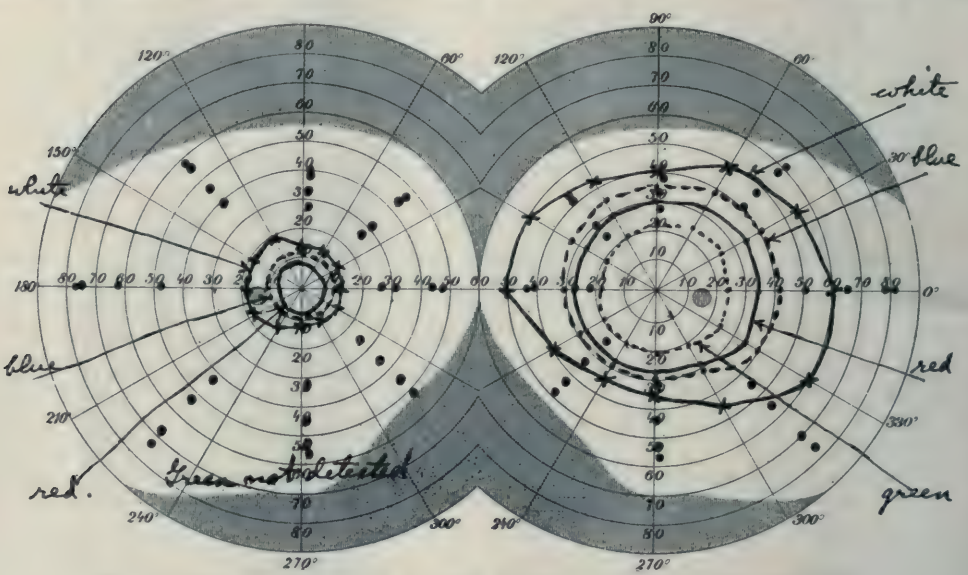

Fig. 3. Fields of vision April 25, 1922 showing greater concentric contraction.

of the case I have just presented, except that his case did not develop acromegaly. Given the unmistakable symptoms and signs of intracranial hypertension, which I have related above, its close resemblance to that of Cushing's case (which was operated upon and a syphiloma of the pituitary disclosed), and the prompt and continuous response to antisyphilitic treatment does undoubtedly throw suspicion upon the unusually severe attack of measles which required prolonged treatment, all of which points toward acquired lues, gumma of the pituitary.

Assuming that syphilis was the primary lesion affecting the gland, it seems reasonable to conclude that enlargement with erosion of the sella could readily follow, resulting from circulatory or other effect upon the hypophysis (hypertrophy or cystic formation).

tolerance to K.I. and mercury, and finally the prompt and continuous response to antisyphilitic treatment over a period of twenty months, with complete subsidence of marked choked disc in each eye. It is difficult for me to appreciate how an ocular condition, such as this man presented, could have been due to mechanical pressure from a new growth, and could have been relieved as it has been demonstrated by antiluetic treatment, notwithstanding our theories and experience as to the nonspecific effect of mercurilization, whether as an antiphlogistic, or an inflammatory antagonist, or as a glandular stimulant simply, or in the development of a synergistic action.

If it is true that to obtain a complete picture of a subject it is necessary to study its *frustes,* I hope the opportunity will be afforded.

A CONSIDERATION OF CATARACT PROCEDURES.

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Points in the erformance of cataract operations are here considered from the writer's point of view. The prevention of infections, preliminary iridectomy, immature cataract, expression of the lens in the capsule as done by Col. Smith, needling, linear extraction and traumatic cataract are discussed. Read before the St. Louis Ophthalmic Society, May 5th, 1922.

While the foregoing is a hackneyed subject, it is not a finished one. Were it so, it would not figure so largely in ophthalmic literature. The end of innovations and modifications has not yet been reached. Out of the mass of cataract literature, a few truths may now and then be gleaned. The trend of affairs is towards a simplification of methods and technic. A brief review may then be in order. No new fact or idea is presented, the subject being brought forward simply to provoke free discussion.

PREVENTION OF INFECTIONS.

In the preaseptic days, mistakes were made thru ignorance of essential causes. In latter days, possibly too great stress has been laid on the necessity of obtaining absolutely sterile cultures from the conjunctiva before operation. All know the utter impossibility of sterilizing a mucous membrane. In the presence of certain bacteria, operation is positively prohibited. This has been learned by experience. The existence of a few colonies of staphylococcus albus has delayed many an operation for a long time, often needlessly. In this respect, the observations of Bell and of Verhoeff have done considerable in dissipating our fear of the staphylococcus albus, and other organisms of no greater virulency. The procedure of Bell, while possibly more effective, is less agreeable. 1% $Ag.NO_3$ solution produces a marked reaction and much discomfort. The reaction is beneficial in that it increases the leucocytic content of the conjunctiva. The leucocytes and antibodies are the real barriers to infection. The use of 5% protargol in NaCl. solution has been used by Verhoeff with satisfaction. It is much less irritating and probably also less effective than 1% Ag.

In spite of sterile cultures and clinically clean conjunctiva, infection may take place; hence, it might be well to employ the method of Bell or of Verhoeff as routine. Most infections are exogenous but some are endogenous. Against the latter, all local measures are ineffective. Bell recognizes this in the advocacy of his three T's—teeth, tonsils and toxemia. A purulent nose, juicy tonsils, foul mouth, or any other obvious focus of possible infection, should be cleaned up before operation, even if they may have no bearing on the progress of the case. The height of the blood pressure and condition of the urine must be known, to obviate complications and embarrassing situations. If possible, operation in a diabetic should be done only when the patient is sugar free. High blood pressure must be controlled by purging, drugs, rest and diet, or, if need be, by bleeding the patient shortly before operation. The combination of arteriosclerosis, high blood pressure and operation, may result in intraocular hemorrhage and loss of the eye.

Likewise, it would be well to know the result of the Wassermann test on every prospective cataract case. Trauma may excite a violent luetic inflammation in a predisposed eye, and why not, therefore, operative trauma? In fact, it does. Traumatic interstitial keratitis is mentioned by Knapp, and in some instances, it has been an issue in medicolegal cases. I have had a case of interstitial keratitis following cataract extraction in a known syphilitic. The first eye was operated upon by Dr. Ewing, who did an unintentional extraction in the capsule. The same thing occurred with me in the second eye. A minimum of trauma was inflicted, yet four weeks after the operation, a keratitis began which ran the typical clinical course of an interstitial

keratitis. Does the trauma incident to the operation cause the various uveal inflammations so often observed? Do such follow operation in a perfectly healthy and sound individual?

In general, the younger the patient, the better the response of his tissues, ocular and other. Babies make astonishing recoveries from illnesses, because they, as a rule, have but one ailment at a time, whereas the adult and particularly the aged, in whom cataract is most frequent, seldom have a single ailment, but a complexity of diseases (cardio-vascular-renal, for example). May not many of the complications of cataract be, therefore, due to hidden or latent infections? Is it presuming too much to say that a stubborn iritis or iridocyclitis following operation may find its explanation in a dental, nasal, tonsillar, tuberculous, luetic or other focus?

Important among the subjects entering into a discussion of cataract is:

PRELIMINARY IRIDECTOMY.

The majority of operators do not favor preliminary iridectomy, giving as their reasons (1) that the patient is subjected to two operations, with two stays in the hospital; (2) that the danger of infection is doubled. The fact of the matter is, that the operator raises these objections in his own mind much oftener than does the patient. If an ophthalmologist is thoroly convinced that a certain line of action is the correct one, he will have little trouble in putting that conviction over to the patient and gaining his consent. The patient knows little about the danger of infection; he knows much about the time he is incapacitated and the cost incurred, but everything sinks into significance when weighed against the possibility of the best result.

The first objection is true, two trips to the hospital are necessary, but the sum total of the time spent thereby is hardly more than the stay necessitated by a one step operation. The danger of infection is not doubled by a two step operation. If the same preliminary and operative care is exercised in both procedures, the danger of infection is reduced to a minimum. In fact, it is my belief that the danger is no greater than in the one step operation, for the following reasons: (1) The probability of infection from an iridectomy is very slight, as witness the great number of successful iridectomies done in the preantiseptic and preaseptic days. (2) In addition, all are familiar with the many cases of penetrating wounds of the cornea at or near the limbus, with prolapse of iris, followed or not by an iridectomy, in which instances the eye healed perfectly with no sign of infection. (3) The aqueous, as soon as the eye is opened, changes its nature and becomes flooded with antibodies. (4) An iridectomy gives a good idea as to how the patient will behave and the eye react. Furthermore, at the extraction, the entanglement of the point of the Graefe knife in the iris is obviated and no bleeding into the anterior chamber from a freshly cut iris is present to interfere with a capsulotomy or capsulectomy. (5) The tonic effect on the eye from an iridectomy seems to be good and the reaction is inconsiderable. (6) In a one step operation, the trauma is cumulative and the reaction likewise cumulative. Preliminary iridectomy is especially desirable in immature cataract, the maturation being somewhat hastened thereby.

Most operators use atropin systematically after cataract extraction. Much of this is the result of habit and training.. Undoubtedly, it is many times not necessary. After extraction following preliminary iridectomy, atropin is seldom required, as the iris is not incised, and hence but slightly irritated. While acute glaucoma after cataract extraction seldom occurs, its occasional occurrence decidedly discourages one in the use of atropin.

IMMATURE CATARACT

The tendency at present is to operate on cataract much earlier than formerly; that is to say, some type of operation is done before the cataract is perfectly mature. The great argument for waiting for complete maturation was that cortex was not left be-

hind. That cortex is left behind even in the clinically mature cataracts has been made evident to all. The dictum that no cortex will be met with in a cataract patient over 75 years is erroneous. In the majority of ripe cataracts, considerable cortex is left behind, concealed posterior to the iris. The number of cases requiring needling does not seem to diminish as the age incidence increases. One great disadvantage in waiting for complete ripening is the attendant physical and mental depression developed by the patient. Because of these and other reasons, numerous procedures were advocated for dealing with immature cataracts, particularly those in which the visual deterioration is nearly equal in both eyes. One has a number of methods from which to choose, the choice depending on what is best suited to the individual case. It is hardly fair to the patient to rigidly adhere to one method to the exclusion of all others.

Roughly, these methods may be divided into (1) the regular capsulotomy extraction. (2) Regular extraction with irrigation of the anterior chamber, thereby removing a large part of the cortex. Because of the criticism of this step, it will later receive separate consideration. (3) Preliminary iridectomy with or without some attempt to hasten ripening; (4) the Homer Smith operation, consisting of a free preliminary capsulotomy eight hours in advance of the regular combined extraction; (5) the intracapsular or socalled Smith Indian operation, or some of its modifications.

If the regular capsulotomy extraction is done, all may be well and a splendid result obtained, provided the residual cortex is of the light, fluffy, nonadherent type. If of a sticky, tenacious and adherent quality, a great deal of trouble may be experienced, and a needling or repeated needling resorted to. Unfortunately, this cannot be told in advance, except that the younger the individual, the more likely will the cortex readily absorb. In addition, the fluffy kind of readily absorbable cortex seems to act less as a foreign body than the sticky type, and consequently less iritis and iridocyclitis is encountered in such instances.

It is probably apropos to discuss anterior chamber irrigation at this point. A positive contraindication to irrigation is a known fluid vitreous or the loss or presentation of vitreous. In the absence of these conditions, lavage of the anterior chamber is most effective in getting rid of blood, cortex and air bubbles. With a collapse of the cornea, its normal rotundity may be restored by filling the anterior chamber with physiologic saline solution. The contention that irrigation enhances the danger of infection has little weight, as the complete apparatus is boiled in the sterilizer. There is no more danger in introducing sterile, normal saline solution into the anterior chamber than there is in the manipulations of the iris repositor. It is a source of great satisfaction to see a mass of residual cortex melt away with irrigation and a perfectly black pupil emerge.

Preliminary iridectomy has received separate consideration. In immature cataract it, in itself, may accelerate maturing, tho often not to any appreciable degree. Stroking of the lens either directly or thru the cornea has never appealed to me much.

The Homer Smith method of preliminary capsulotomy has not gained many adherents. My personal experience with it has been limited, but favorable. One trip only to the hospital is required, but two complete aseptic preparations for operation are necessary. A wait of more than eight hours between capsulotomy and extraction may allow the cortex to swell sufficiently to irritate the iris and make local anesthesia difficult. The secret of success with the Homer Smith method seems to reside in a full and free capsulotomy. Unless a large cut is made in the anterior capsule, sufficient opacification of the cortical material and its separation from the lens capsule will not take place. A free crucial incision is made in the lens capsule with the pupil well dilated with atropin.

The intracapsular operation has been better advertised and "press agented" than any other procedure. Its propaganda is still going on. It was seized upon so readily because the wish was father to the thought. We wished and hoped to get rid of all our troubles at one fell stroke, and the removal in the capsule promised relief from retained cortex, iritis, iridocyclitis, after cataract, needlings, etc. How much of this has been fulfilled is known to all of you. Even in the highly successful cases, one thing has been made apparent; viz., that the eye, after the intracapsular extraction, is for a long time a weak, watery, sensitive and irritable eye. It takes a long time for it to "settle down." Another point, privately stressed by Dr. Green, is that glaucoma is prone to develop after the intracapsular operation. This opinion arose from his observation of three cases of increased tension following intracapsular extraction, noted during one month. Glaucoma, of course, has been observed after every type of operation. Would not some of these eyes have developed glaucoma if no operation had been done? One cannot say, but it is possible. Peripheral anterior synechiæ, incarcerated iris, lens material, lens capsule or vitreous may account for some of the cases. This chapter in ocular pathology is still undeveloped. Following Col. Smith's visit to St. Louis last year, I was requested to prepare an editorial which appeared in the August, 1921, number of the Missouri State Medical Journal, and which I take the liberty of repeating here:

COLONEL HENRY SMITH'S VISIT TO ST. LOUIS.

"The great reputation gained by Lieut. Col. Henry Smith, of the British Indian Medical Service, in cataract work, evoked the interest of American ophthalmologists. The oculists in St. Louis, no less than those of other cities, were desirous of seeing the master himself at work, consequently Colonel Smith was invited to visit St. Louis and give a demonstration of his method. He graciously acquiesced in both respects, the Ophthalmic Section of the St. Louis Medical Society acting as his host on June 24 and 25. A clinic was held on the 24th, at which forty patients were operated upon. In two instances the ordinary capsulotomy operation was done, in two others secondary membranes were removed, and in the remaining thirty-six cases the intracapsular operation, for which Col. Smith is noted, was performed.

At the outset, it is only fair to state that the operator was working amidst unfamiliar surroundings, with instruments not his own and not in the best of condition. Also, that the cases were not of his selection, and the histories of the patients were virtually unknown to him. Furthermore, his audience was a critical one, and in some respects not wholly sympathetic. To have had his own highly trained assistant would have proved a great advantage. Undismayed by all this, Colonel Smith courageously went ahead. An operator demonstrating his method away from home is always beset with these difficulties, and in addition is generally presented with a fairly large proportion of difficult, complicated, or unsuitable cases. The clinic under discussion was no exception in this regard.

To preserve an open mind before seeing a celebrity operate, is the creditable and proper attitude. To form definite opinions after viewing his performance, is both human and natural. It is very doubtful if Colonel Smith made a single convert in St. Louis to his method. The intracapsular operation, safeguarding the interests of the patient and giving the greatest visual result, is the hope of many ophthalmologists; but in its present form, the Indian operation cannot be said to meet these requirements. This is the individual opinion of the writer, and may not be the opinion of others. First, the trauma to the eye is excessive; second, the proportion of vitreous losses is too great; third, the corneal incision is not conducive to rapid repair and produces in many instances a high grade astigmatism; fourth, and in the writer's opinion one of the greatest objections to the operation as

done by Colonel Smith himself, is the fact that a proper toilet of the eye is impossible; fifth, the corneal incision, large coloboma, lack of reposition of the iris, and drawn up pupil, produce an unsightly looking eye. It may be argued, and justly so, that vision and not a cosmetic result is the desideratum. The cosmetic result, however, weighs heavy with the American patient, especially if he knows that he can have it in addition to the visual result.

So far as the writer has ascertained, no primary infection occurred in any of the cases, which is remarkable in view of the fact that asepsis in the sense common to most American ophthalmologists was not practiced. The many weary hours put in by our operators in preparing patients, scrubbing hands, and in the countless details making up an aseptic technic, were made to appear as Love's Labor Lost. The law of averages, however, will be found to operate in favor of asepsis as we practice it. The thumb sponge of Colonel Smith will hardly commend itself to our confreres.

Altogether, the demonstration by Colonel Smith was highly interesting and educational. If anything, the audience, with possibly few exceptions, was convinced that the older methods had best be adhered to, for if the man who has done 50,000 cataracts runs into so many difficulties and complications, what would be the fate of the tyro? An operation does not end at the operating table. There are postoperative complications and sequelæ. The procedure giving the minimum of these is the best operation, providing always that the maximum of vision is obtained. Furthermore, we have to live with our patients.

The one advantage of the Indian operation is that the lens is removed in its capsule; its disadvantages have been enumerated.

In selected cases, and in those over 60 years of age with no contraindications, the following technic embodying the central idea of Colonel Smith's procedure might be carefully tried out: First, a careful corneal section coming out at the limbus, or with a small conjunctival flap; second, a clean radial iridectomy; third, a trial with a squint hook in making pressure to break the zonule. With weak zonules, this is easily accomplished with slight pressure. Fourth, a careful toilet of the wound with reposition of the iris. Done in this manner, it is doubtful if the number of vitreous losses will be any greater than in the older operation. They should be much less as the cases are selected. Under 60 years of age and in high myopia, or with fluid vitreous secondary to uveal disease, any intracapsular operation is contraindicated, and all operations are fraught with danger. To these may be added all arteriosclerotic individuals and those with high blood pressure.

The foregoing has been written in the kindliest spirit and is not meant to reflect on the personal charm or great skill and dexterity of Colonel Smith. Some of the operations, particularly the complicated ones, were most skillfully performed. One capsule remains was removed in toto, and in a cataract secondary to iritis, with the iris bound down to the lens, the synechiæ were loosened and the lens removed in its capsule with no loss of vitreous, in a manner demanding the greatest skill and courage. It was done in a matter of fact way as being all in a day's work."

A questionnaire sent out five months subsequent to this series of operations revealed the following interesting facts, which were communicated to the Ophthalmic Section of the St. Louis Medical Society. Reports of 41 operations were returned, tho the number operated upon was supposed to be forty:

Mature cataracts	16
Immature cataracts	21
Iridectomy done in	36
Intracapsular operation done in	36
Capsulotomy done in	2
Secondary cataract done in	3

Vitreous loss in 11 cases.
Iritis followed in 12 cases.
Iridocyclitis in 14 cases.
Choroidal hemorrhage in 5 cases.
Prolapsed iris in 9 cases.
Updrawn pupil in 20 cases.
Enucleation done in 3 cases.

Striped keratitis recorded in 8 instances.

With reference to the vision, it was 6/6 in two cases, one of these being a capsulotomy operation in a 27 year old man; 6/9 in 4; 6/13 in 5; 6/15 in 2; 6/20 in 3; 6/25 in 3; 6/40 in 4; 1/37 in 1; P. L. or H. M. in 6; nil in 4; enucleations 3; Not recorded, but bad in 4.

NEEDLING OR LINEAR EXTRACTION.

In a discussion of cataract, some reference must be made to needling. It has been customary to handle congenital cataracts and traumatic ones in young people by doing a single or repeated needling. In a proportion of the case a good result is obtained, but many times thick capsular remains are left behind, and the result is only a partial success. I question the wisdom of throwing such a burden on the eye as is entailed in the absorption of large swollen masses of lens material. This applies particularly to bilateral conditions, such as total congenital and zonular cataract.

The lens is an epithelial structure, also a proteid substance; when exposed to the fluids of the eye, it is absorbed, and, as a result, has the power of sensitizing the eyes to lens proteid. The subsequent needling of the second eye may, therefore, be attended by serious risks. Even in the absence of this more or less theoretic danger, no great good is apparent in delaying the desired end result, which is a clear pupil. Needling was proposed and practiced before the era of aseptic surgery, and was a much safer operation then than linear extraction.

The advantage of needling seems to have disappeared with the advent of asepsis. The trauma connected with needling is not limited to the making of a rent in the capsule, but is continued by the swelling and absorbing lens substance. In the aggregate, it may amount to much more than the trauma incident to a linear extraction. Repeated needlings may be required, whereas a single operation, as a rule, is all that is necessary in linear extraction. The latter usually is not, but may be done without an iridectomy. The time element is of prime importance, linear extraction accomplishing the result much more rapidly and satisfactorily and with less ocular reaction.

TRAUMATIC CATARACT.

The treatment of a traumatic cataract depends on the age of the patient and the condition of the lens. If the opacity is of slow formation, it may be let alone, to be removed later by linear extraction if the patient is young, or by regular extraction if older. A rapidly swelling lens in an adult, and frequently in a child, demands evacuation to relieve the secondary glaucoma.

This phase of cataract is so familiar to all, that it need not be dwelt upon. So many patients are disappointed with the visual result after the removal of a unilateral cataract (usually traumatic) that some ophthalmologists decline to operate. Three advantages, however, may be emphasized; (1) the eye and patient are prepared for eventualities should anything happen to the good eye; (2) the cosmetic appearance is improved; (3) the patient is given a field on that side.

The question as to whether the retina ceases to function when excluded from use for a long time by an opaque lens, may be made an issue. I operated on a man whose right lens had been cataractous from trauma for 22 years, and who now depends solely upon that eye in his daily work.

SUMMARY.

In conclusion the following points might be emphasized:

(1) Preparation of the patient and an inquiry into his general physical condition will do much to improve cataract results.

(2) The staphylococcus albus is no barrier to operation, if some method, such as Bell's or Verhoeff's, is employed.

(3) Preliminary iridectomy if advisable for a one eyed patient is certainly not inadvisable for a two eyed one. Its many advantages outweigh its disadvantages.

(4) Atropin should be more sparingly used after operation than is customary.

(5) Immature cataract, especially bilateral, must be dealt with before physical and mental depression set in, the choice of operation being left to the discretion of the operator, with regular extraction, plus lavage, or the Homer Smith procedure offering the best possibilities.

(6) The intracapsular operation as done at present leaves much to be desired. The maximal trauma produces a week, irritable, watery eye for a long time. The possibility of a subsequent glaucoma must be given consideration.

(7) Traumatic and congenital cataracts can be handled better, quicker and with improved results by linear extraction than by needling.

(8) Retained cortex is an irritant, acts as a foreign body and may sensitize the other eye to lens protein. This is an argument for evacuating swollen lens material after trauma instead of allowing spontaneous absorption, even tho secondary glaucoma is not present.

INTRAOCULAR MALIGNANT TUMORS IN YOUNG CHILDREN.

CHARLES J. ADAMS, M.D.

KOKOMO, IND.

A report of three cases, probably glioma of the retina. Two of the cases were in sister and brother. Read before the Indiana Academy of Ophthalmology and Oto-Laryngology.

I wish to place on record three cases of intraocular malignant tumor in young children. In order to be brief, I will omit any reference to the literature on this subject.

CASE 1. E. M., age three, female, referred by Dr. John Cooper, Kempton, Ind., July 16, 1919.

No history of malignant growths in any of the child's blood relatives. Child had never had a sick day. Parents discovered that the right eye was blind when patient was six months of age. No examination was made, however, by any physician until just before the case was referred to me. At this time, right eyeball appeared to be larger than the other and pupil was white.

Examination: Vision nil, no reaction of the iris, anterior chamber shallow, pupil small and reddish white. Lens clear, but was not able to see any part of the fundus. Could easily distinguish the tumor mass, covered by retina and apparently pressing against the posterior pupillary margin. There was no pain. Tension of eye not taken. The external parts of the eye and adjacent structures were normal.

Left eye normal. At the time of operation, I dilated the pupil of this eye and made a thoro ophthalmoscopic examination. Vision appeared to be perfect.

The right eye was successfully removed with at least one-half inch of the optic nerve. Wound healed satisfactorily.

Diagnosis by Dr. Ludwig Hektœn, neuroepithelioma, glioma.

Oct. 20, 1919, discovered a recurrence in the orbit. A small bit of tissue was again sent to the pathologist, and he was requested to section the optic nerve and investigate it for glioma. He reported that "the tissue was gliomatous, and it was evidently a recurrence, as a section of the optic nerve showed gliomatous infiltration thruout its length." The use of radium was refused by the parents, and the child died two months later after having been subjected to the merciless ministrations of one of the cancer paste specialists infesting our community.

The interesting feature of this case was the complete gliomatous infiltration of that part of the optic nerve attached to the eyeball. Just how far back towards the brain the infiltration had gone is a matter of conjecture.

The question of what should be the rational procedure to follow in these cases arises in one's mind. I am of the opinion that what is done should be prompt and thoro. If the tumor is confined within the eyeball, I believe it is only necessary to remove the eye and as much of the optic nerve as is possible by the use of the snare. Then a complete examination should be made by the pathologist, not only of the intraocular tumor but of the optic nerve as well. In the event that the optic nerve is completely or only partially infiltrated, there should be a complete exenteration of the orbit. In either event, there should be a complete and proper exhibition of radium following the operative procedure.

Case 2. L. B., age two and one-half years, female, referred by Dr. R. B. Shoop, Sharpsville, Ind., July 5, 1919.

Family history negative on both sides. Personal history, healthy in every respect with the exception of the eye. Parents discovered that the left eye was blind at three months of age, and that it was enlarged. It continued to enlarge until at the time of my examination it was approximately twice the size of the other eye.

Examination. Child was hard to manage and could not make complete examination of either eye. The left eyeball was proptosed about one-half inch. The crystalline lens was dislocated forward, pushing the iris in front of it to the posterior surface of the cornea. Lens was opaque. For past three or four weeks, child had been suffering very severely from the pain in this eye.

At the time of operation, I examined right eye under mydriatic, and discovered in the internal and inferior part of the fundus a large mass covered by retina. The retina was almost opaque, but the tumor shone thru it as a dull red mass. Retinal vessels, while somewhat enlarged, did not appear abnormal, and the retina at no place appeared to be intimately connected with the tumor. The tumor appeared to be a rough, uneven structure, and the retina was apparently draped over the mass, merely touching the high spots. The retina was normal and attached in the upper and external part, above a line drawn horizontally just superior to the macula, and external to a line drawn perpendicularly thru the macula. The eye was hypermetropic several diopters.

Operation. I removed the left eye July 6, 1919, successfully. Parents of patient refused permission to remove right eye. At this time, my usual procedure was to amputate the optic nerve with scissors passed between the eyeball and the external canthus. After several unsuccessful attempts, I was forced to pass the scissors between the eyeball and the internal canthus when I was successful at the first effort. I discovered that the failures were due to the fact that the optic nerve, after leaving the globe, had at one-eighth of an inch distance turned at right angles, and was directed towards the ethmoidal region.

The Laboratory of Pathology and Bacteriology of Chicago reported the case to be a "small, round celled sarcoma attached to the retina, with no involvement of the optic nerve."

There was a speedy recurrence of the tumor mass in the orbit, and on August 15, 1919, a complete exenteration of the orbit was made down to and including the periosteum, and an attempt was made to get as much more of the optic nerve as could be drawn thru the optic foramen. Radium was refused. In less than a month there was a recurrence in the orbit which grew rapidly. Child died two and one-half months later.

With the desire of reporting this case in the American Journal of Ophthalmology, and suspicious of the diagnosis of the Laboratory, I wrote to Dr. Edward Jackson concerning the case. In reply he stated that, "The only primary growth known to start from the retina is glioma, and if the case is reported as sarcoma it would have to be backed up by a very careful detailed account of microscopic findings." On two or three occasions, I took this matter up with the Laboratory by letter, and each time was assured by them that they absolutely stood back of

their diagnosis, not only on the reports issued, but in addition offered to supplement it by "a report which you can incorporate in your article which you state you wish to write." They assured me, that when the specimen was sent to them, it would be carefully preserved awaiting my further instructions. However, all the satisfaction I obtained was promises, and a recent letter written them was not answered. It is my opinion that the tumors in this case were gliomatous instead of sarcoma.

CASE 3. A few days after the death of the little girl, there was born to the same parents what appeared to be a normal, healthy boy. Saw this baby when it was a month or six weeks old and, while no ophthalmoscopic examination was made, the eyes appeared normal. I really had no reason for suspecting the same disease in this child. At three months of age, it was discovered that there was a white tumor in each eye.

I saw this child a short time ago, when it was just slightly past two years of age, and discovered a gliomatous looking mass obstructing both pupillary spaces. I think I am safe in stating that this is the same malignant neoplasm that destroyed his sister. Parents refused to have anything done.

DISCUSSION: In a brief review of the literature, I noticed that Fuchs quotes Leber as saying that 40 to 50 per cent of cases will get well if the eye is enucleated soon enough.

Rex Duncan reports three cases which he thinks were cured by the use of radium. These are reported in the American Journal of Ophthalmology. Kauslma has an article on the use of the X-ray, but his conclusions are rather indefinite. Really, you could not discover whether he thought it was or was not beneficial.

The incidence of the disease is estimated to be 1/100 of one per cent, over a period of forty-two years, by The Royal London Ophthalmic Hospital.

Regarding the sarcoma being attached to the retina, I did not think it was, but I thought it would be interesting if this was the case. I took the matter up with Dr. Faith, of Chicago, who advised having serial sections made of the optic nerve; but unfortunately I was unable to get hold of the eye, nor was I able to get any satisfaction from the pathologic laboratory. I thought it was rather interesting and I wanted to get all the information they had to offer. They informed me that Doctor Hektœn was their consulting pathologist, and they would stand back of their diagnosis.

One thing I forgot to put in my paper. Just back of the eyeball, in the first case, possibly 2 mm. of the optic nerve was normal, then there was an enlargement of about 3 or 4 cm. in diameter.

NOTES, CASES AND INSTRUMENTS

IMPRESSIONS OF THE CUBAN OPHTHALMOLOGIST.

C. B. Welton, M.D.

PEORIA, ILL.

Read at the banquet of the Eye, Ear, Nose and Throat Section of the Illinois State Medical Society, May 16, 1922.

The practice of medicine in Cuba is entirely different from that in the States. Cuban people are either rich or poor, and the staunch middle class people we have in America are not found here. This condition has a bearing on medical practice, in that the poor people can not afford to employ the high class Cuban physician, in consequence of which there have been formed what are called in Cuba societies, similar in some respects to our fraternal orders in the States, but having no secret work. They are organized along social, educational, recreational and athletic lines, but mainly for medical services, which they receive from the highest class of Cuban physicians.

These members pay dues of two dollars per month, which entitles them to free medical, surgical and hospital care, the use of their club rooms, entertainment, etc. There are six large societies in Havana, the largest of which has a membership of 60,000, the smallest of these 5,000, two Cuban and 4 Spanish. The societies have their own complete hospital buildings and grounds, each with its contagious ward, insane ward, operating pavillion, eye and ear department, etc. The buildings and grounds are laid out similar to the State Hospitals for the insane in Illinois, but of course not so extensive in size. On being taken thru the different wards, I was much impressed with the skillful and thoro treatment these patients were accorded, and the high type of men that are obtained as managers or heads of the different organizations.

The medical staff of these institutions are composed of some of the best physicians and surgeons in the city, and their pay, which is monthly, is very small, or about $200. Their private practice is where these physicians make their money, but the experience gained in the institutional work is invaluable to them. Many resign from the society work when it becomes too great a burden. I find the Cuban doctors to be men of alert mentality, students of and contributors to medical literature, who keep abreast of the times. Also they are skilled operators and keen observers, with the highest degree of diagnostic ability.

One of the Cuban societies, the Centro-Gallego club, has erected a building costing $2,500,000, which encloses the beautiful National opera house, with its wonderful theater and magnificent ball room.

A large institution on the Malecon is the Orphan Asylum run by the Sisters of Charity, where in the rear of the building is seen the little door thru which unfortunate infants are secretly entered. They are reared and kept in the institution, both male and female, until they attain the age of twenty-one. The San Lazaro hospital for lepers, of whom there were 500 on the island twenty years ago, faces the Gulf on San Lazaro Street. The disease here is not of a contagious type, and those afflicted with it are decreasing in number. American medical men, the late General Gorgas and Major Walter Reed, eradicated the scourge of yellow fever in Havana by exterminating the mosquito, and since 1901 the city has been exempt from this terrible disease.

At the present time, no screens are used in the hotels or homes in Havana, and no mosquitoes and very few flies are seen. There were 50,000 cases of malaria treated in Havana last year, all from the interior of the island. This is a disease they are continually fighting in Cuba. Very few cases of typhoid fever are seen, and Cuban people do not suffer from dental sepsis and decay like we do in the States, the Latin-American race seemingly having better teeth than their neighbors in North America.

Ten per cent of the inhabitants of Cuba suffer from chronic alcoholism, and while the male population are inveterate smokers, using a great amount of tobacco of the blackest and strongest kind, scarcely any cases of tobacco blindness are seen. This apparent resistance to the action of nicotin I figure is due to the outdoor life the people lead, and to the profuse amount of water thrown out by the skin in perspiration.

There are seventeen oculists and aurists in Havana. Seven are exclusive eye surgeons, and 10 combine eye, ear, nose and throat work. These physicians see annually from 1000 to 6000 cases. Dr. J. Santos Fernandez of Havana is the dean of Cuban Ophthalmologists.

Dr. Fernandez was born at Matanzas, Cuba, in 1847, and was sent at a very early age to study at Madrid and Paris. He was graduated in 1872 and entered Professor Galezowski's Clinic, where he became first Assistant and Chief of the Clinic. In 1874 he had a large eye Clinic and Dispensary at Toledo, Spain. In 1875 he returned to Cuba and established his Eye Clinic, which has operated continuously since that time. He was the first man, for several years, to practice ophthalmology exclusively in Latin-America. When Pasteur informed the world about his discovery of inmunization to rabies, Dr. Fernandez established the first Pasteur laboratory in America, long before any in the United States, and the second laboratory of this kind in the world. This happened in 1887.

He also presented the Mercedes Hospital with its first sterilizing plant. He has been very actively engaged in all social problems, such as the campaign against glanders, prostitution, tuberculosis, Child Welfare, Humane Societies, etc. He was elected president of the Academy of Sciences in 1900, and has held this chair continuously until the present time. He is also an honorary member of many international societies. He has been a prolific writer, having written over 2000 different papers, mostly on eye diseases and operations. Dr. Fernandez founded two medical papers that still live, one 47 years old and the other 22 years. He is easily the most prominent Spanish speaking Ophthalmologist.

Many cases of conjunctival disease are found here, much of the lid troubles being due to the intense glare of the sun, and also many cases of trachoma are seen. Trachoma is treated by expression and copper sulphat. They have a form of swimming conjunctivitis which is due, they claim, to dandruff from the scalp of the male. Great numbers of the inhabitants wear the dark, B. tinted, Crookes' lenses, to protect their eyes from the sunlight.

Cases of cataract are very common in Cuba. No Smith-Indian operations are being done, for their experience with the operation has not been successful, on account of vitreous loss and deformed pupils. They do a one stage operatiton, and the section and capsulotomy are combined. Many corneal diseases are common. In hypopyon and pneumoccocus ulcers, parenteral injections of milk are being used. They are also using this injection in the severe infections of the interior of the eye and in iritis, with excellent results. Their lacrimal cases are nil. The negro have a large straight canal, the white a longer, narrow and crooked canal, but in neither white or black are lacrimal cases seen.

In cases of scleritis and episcleritis, they have obtained good results with bacillary emulsion, and are using this extensively. For the operative treatment of glaucoma, they are doing the classical iridectomy. No trephining operations are done because of delayed infections. Sympathetic ophthalmia is hardly ever seen by the oculists in Havana. In 75,000 cases, Dr. Fernandez told me he had never found a case of sympathetic disease. In their tonsil operations, they do dissection with the knife, and the Sluder operation for protruding tonsils. They use very few general anesthetics in tonsil work, injecting for local anesthesia in as young as 5 years of age.

In nasal diseases, many Cubans suffer from nasal asthma and vasomotor rhinitis (no ethmoid involvement). For operation in these cases they use the cautery and turbinectomy. They have no cases of hyperplastic ethmoiditis. In the ear work, they have very little mastoiditis, but they have a good deal of ear trouble from aspergillus. Thirty per cent of the inhabitants are syphilitics, and they have a great deal of acquired and hereditary interstitial keratitis.

The natives of Cuba, however, do not suffer to the same extent from the infections of the tonsils, nasal or ear diseases as the people in our country. Taken altogether, these people are hospitable and delightful, and we can envy them the outdoor life they enjoy the whole year round, in a balmy climate, unsurpassed in any other part of the world.

INFECTED CORNEAL ULCER.

EVERETT C. MOULTON,

FORT SMITH, ARK.

Mrs., A. M., aged 66 was seen April 21, 1918. April 16, while milking a cow, the animal's tail switched, striking the patient in the right eye. Two days later, the eye commenced to pain and get red, growing worse to date. Now, a deep seated, constant neuralgic pain, particularly prominent in the right temple, of which she complains greatly.

Examination: There was marked injection of the bulbar conjunctiva, especially the temporal portion, which was deep, involving the ciliary vessels. The palpebral conjunctiva was moderately injected. The lids were very slightly swollen, with a narrowed commissure. Some secretion of a thick nature in the lashes of the upper lid. Extending from the temporal edge of the pupil to within a millimeter of the temporal limbus, was a round corneal defect filled with mucoid secretion. A smear of this material disclosed the pneumococcus.

The outline of the ulcer was irregular and ill defined. It extended down to Descemet's membrane, the margin being undermined slightly all around. The base was infiltrated and the zone of extension indicated a downward progression. There was no pannus. From the temporal limbus, a few vessels of repair could be distinguished. The pupil was normal in size and outline, but reacted very sluggishly to even strong light. The anterior chamber was of normal depth, but contained a very slightly hazy aqueous with minute hypopion. The iris was of a dusky blue compared with the bright blue of the fellow eye. There were no adhesions to the cornea. By the ophthalmoscope, a bright pupillary reflex could be determined, but no details of deep structures made out. Pupil dilated regularly and widely under influence of atropin. Tension by palpation normal, altho the eye was quite tender to pressure. Vision R. = 12/70; L. = 12/13, approximately. The patient was illiterate.

Treatment: At this time the eye was cocainized and the ulcer thoroly cauterized with the cherry red tip of the electric cautery, and dionin instilled.

Daily, for one week, the ulcer was cleaned out by directing a stream of one part formalin in 500 parts of water against it from a hypodermic syringe, holding the point of the syringe about an inch away from the eye. Atropin and dionin solutions were instilled, and the eye bandaged daily. On the last two days of the week, tinctur of iodin was also applied to the ulcer (at this time there was no optochin to be obtained in town). So far the ulcer had not extended, altho the hypopion had gradually increased until it was 3 mm. deep.

On April 30th, the temporal edge of the ulcer gave evidence of reinfection, because of the whitish appearance of the margin. This was removed by the electrocautery.

On May 1st, the hypopion being no less and the ulcer not improving, a Saemisch incision was performed, the incision being horizontal, and the hypopion evacuated. There was no prolapse of the iris, the aqueous being allowed to escape gradually. The next

day the anterior chamber was reformed, no hypopion present, the immediate cornea surrounding the ulcer was less cloudy, and the patient was free from pain and looked brighter.

At this point it was possible to obtain some ethylhydrocuprein, and a 1 per cent solution was prepared. The paracentesis wound was reopened with a fine silver probe, and two or three minims of the optochin solution injected thru the cut into the anterior chamber. The eye was bandaged again for 24 hours. During the next week, she used 1% optochin in the conjunctival sac every hour while awake. She went home, June 8th, with the eye almost quiet, the ulcer being healed, and with vision of 12/70. She took home for use an atropin solution ½ per cent, and 25 per cent argyrol three times daily. During her stay, under my care, it was necessary two or three times to order a calomel-saline purge.

AUTOOPHTHALMOSCOPY. SUBJECTIVE EXAMINATION OF THE RETINA.

S. I. Eber, M.D.

PITTSBURGH, PA.

Autoophthalmoscopy or autoophthalmo-fundoscopy may be defined as that act of performance by which one may view his own fundus oculi.

Many different methods for this purpose have been described, and many instruments have been designed by Purkinje, Coccius, Heymann, Giraud-Teulon, Zehender, Wessely, Gould and others. But all of the various methods thus far described have been exceedingly difficult, and the various instruments devised for that purpose are more or less complicated, so that only a skilled ophthalmologist has been able to observe his or her own retina by using the other eye; that is to say, in making an observation of the retina of the left eye, one would be required to see it with the right, and vice versa. Such an observation is of little or of no practical value.

The writer has employed an original method, which presents distinct advantages over those heretofore described. By this method, the patient, whether child or adult, may readily see his own retina and be able to describe to the physician its appearance, in accordance with his intelligence. In the method employed by the writer, a specially constructed instrument is unnecessary. Thanks to electricity, a transilluminator in good working condition will serve for the purpose. The writer uses a DeZong ophthalmoscope with its mirror part removed, as no mirror is necessary. After removing the mirror part from his electrical ophthalmoscope, he calls it an "autoophthalmoscope."

Technic:—The writer introduces the autoophthalmoscope slightly into his orbit, above or below the eye, and moves it (the scope) back and forth constantly from right to left and from left to right, stimulating the retina, whereby a beautiful view of the inverted image of the fundus oculi appears before him greatly magnified.

An autoophthalmoscopic examination may be performed in a lighted or in a dark room; the retina is much better seen in the dark room. It may be performed with eyes open or closed; the retina is seen much better with the eyes closed.

By the method employed by the writer, the region of the macula lutea appears most clearly. The optic disk appears as a black spot from which emerge the retinal central blood vessels branching off to be distributed thruout the retina. The retinal vessels also appear dark, and are richly branched. No distinction can be made between arteries and veins from their appearance.

What is the value of autoophthalmoscopy as employed by the writer, and as herein described? This method is, of course, in its infancy. Time alone will determine. It is the intention of the writer to add this method to the routine subjective examination of each and every patient. It should unques-

tionably prove of marked value in the diagnosis of intraocular affections, where ordinary methods to ascertain their presence cannot be employed. It may also prove a valuable aid in the diagnosis and localization of certain brain lesions.

The writer earnestly requests that those fellow practitioners having large amounts of clinical pathology employ the method described herein; which he trusts will be found of practical value in the fields of ophthalmology and neurology. He further suggests discussion of this method by written articles in the columns of this or other Journals.

(The method of observing the shadows of the retinal vessels was suggested by Purkinjé in 1823 and has often been described in books on physiology and ophthalmology since. The small electric light bulb, that can be pressed against the eyeball, or the lids, greatly facilitates this method of examination. As Dr. Eber suggests it may be made of practical value and importance; and it should be carefully studied with that end in view. It would be a mistake to call it ophthalmoscopy, being not practiced with the ophthalmoscope, and constituting quite an independent method of examination.—E. J.)

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

OPHTHALMOLOGICAL SOCIETY OF EGYPT.

March 3rd, 1922.

Dr. Mohammad Bey Saleh, President.

Perforation of Cornea by Piece of Egg Shell.

Dr. A. Migally reported the case of a girl of 12, cooling an egg by throwing it in the air and catching it, when its shell broke and pieces flew into her eye. Three days later, three minute pieces of egg shell were found near the center of the cornea, and in a wound, 2 mm. long, a small piece was embedded, projecting into the anterior chamber. Dr. Mazni, who was present for inspection of the hospital, removed the three minute pieces from the surface with a spud, but the larger piece, a triangle 1.5 mm. on each side, slipped into the anterior chamber. On attempting to extract it thru a limbal puncture, with iris forceps, it disappeared in the upper iris. Next day it was not visible, but the eye was quiet. Iridectomy was done, and the piece of shell found embedded in the iris was removed. A week later the eye was quiet and vision 4/60, the cornea being nebulous from old trachoma. The small size of this foreign body was thought to make it impracticable to have held it in the corneal wound, by an instrument first introduced at the limbus. The importance of noticing exactly where the foreign body disappeared was emphasized.

Blindness in Egypt.

Dr. A. F. MacCallan found, that of hospital patients, 12.2 per cent were blind in one or both eyes, the definition of blindness being inability to count fingers at 1 meter. The percentage had remained substantially the same since 1909, but the census showed a decrease of the total number of blind in the community from a percentage of 4.575 in 1907, to 4.358 in 1917. The decrease had been less because of bad food conditions, 1918 and 1919 showing slight increase. The incidence of blindness varied in different localities, Port Said and Alexandria having less than other places. The proportion of the blind to the total number of patients rose for each decade of life from 4.68 under one year to forty, 4.34 over seventy years. Among 18,198 cases of blindness, the most common causes were total opacity of cornea, 5,033; shrunken globe, 4,390; secondary glaucoma, 2,711; primary glaucoma, 1,705; cataract, 1,499. Only 17 cases were congenital.

Visit to European Clinics.

Dr. A. F. El Rasheed Bey reported his observations in a summer visit to the ophthalmic clinics of Vienna and Berlin; and especially with reference to the methods of treatment and operative procedures there practiced.

Pseudomembranous Conjunctivitis Treated with Antidiphtheritic Serum.

Dr. M. Sobhy Bey reported 4 cases, in 3 of which the condition of the cornea was threatened. In none of them was the Klebs-Loeffler bacillus present. Two were gonococcus infection; one showed the bacillus subtilis, and the other the pneumococcus and xerosis bacillus. In all of them the injection of antidiphtheritic serum was followed by rapid improvement, altho they had been doing badly under standard treatment. The doses given varied from 2,000 to 8,000 units, or as much as 10 c.c. of the serum.

Milk Injections.

Dr. M. Tewfik believed these were worthy of a full trial in all bacterial infections. He reported 3 cases, one of gonorrheal ophthalmia with sloughing of the conjunctiva and hazy cornea; one of abscess of the orbit, into which the probe could be passed two inches; and one of dendritic ulcer of the cornea. Rapid improvement and a good result were obtained in all cases.

Foreign Bodies in the Eyeball.

Dr. Z. Seddik reported a case in which, while chipping a piece of cop-

per with a chisel, something flew into the eye. He was treated for a month, no foreign body being suspected, before he was sent to Mansura Hospital for magnet diagnosis and treatment. The Haab magnet gave a strongly positive result, but it was impossible to draw the foreign body into the anterior chamber. Iridectomy was done, and in the piece of iris removed, two small pieces of metal, one by two millimeters, were found glued fast by inflammatory exudate. Cataract followed, but after repeated needlings vision = 6/9 partly, was obtained.

Ethmoiditis Simulating Orbital Tumor.

Dr. R. B. Dolbey reported 4 cases in which suppuration of the ethmoidal sinus simulated orbital tumor, so that they came to operation. In each case the eye was displaced downward and outward. In only one case was there any nasal discharge, and in it suppuration of the frontal sinus was also present. Two of the patients were adults and two children. "On operation (modified Krönlein), subperiosteal exploration of orbit thru eyebrow and inner canthus incision, the ethmoidal cells and orbital plate of the ethmoid bone were found to be bulged forward into the orbit by a mass of yellow secretion, under great pressure, and necrosed fragments of the ethmoid bone. The bone disease extended from the anterior ethmoidal cells to the sphenoidal sinus and the region of the spheno-maxillary fossa." Drainage was made into the nose by a big tube. These cases had slowly developed following an epidemic of influenza in 1919, and came to operation within the last fifteen months.

Filarial Cyst of Orbit.

Dr. M. Sobhy Bey reported the case of a man of 30, who had noticed bulging of the left eye for 2 years. A soft, tender, fluctuating mass could be felt at the outer side of the orbit, separating the outer wall from the globe, which was pushed down. A Krönlein operation was done, and the wall of the cyst accidentally ruptured. The cheesy material poured out was collected aseptically and searched in vain for evidence of psammoma (it extended thru the sphenoidal fissure) or of any germ, especially the tubercle bacillus. But in a smear from an inoculated tube, microfilaria were found, believed to be embryos of filaria bancrofti. Examination of the patient's blood at night showed these to be present in large number. It was thought that injury to the cyst might have brought the death of the filarial worm present in the orbit, with inflammation of surrounding tissue. But it was possible the microfilaria found in the cheesy matter got there thru contamination from the patient's blood during operation.

Appearance of Fundus in Ankylostoma Infection.

Dr. M. Riad reported the appearances found in 20 cases of severe anemia due to anklyostoma worm infection. In 7 cases the percentage of hemoglobin varied between 30 and 50, in the others it was 60 to 70. In the former the fundus reflex was light yellow instead of rich red; veins large, tortuous, flabby, and had the appearance of flattened ribbons; arteries were thin and in a few cases the retinal arterioles were corkscrew shaped. In one case the superior and inferior retinal arteries were pulsating. This is explained by the fall of arterial pressure. In one case, with hemoglobin 40 per cent, a few white dots were observed, and two fresh flame shaped hemorrhages. In a negro, with hemoglobin 30 per cent, vision R. 6/24, L. 6/18, choroidal reflex was pale, veins dilated, tortuous and pulsating, arteries thin, disc very pale with sharply defined edge, the left being paler. Fields showed contraction.

Optic Atrophy.

Dr. A. F. MacCallan, under the heading of interesting cases seen in 1921 at the Egyptian hospitals, calls attention to the classification recently worked out for the large number of cases of optic atrophy encountered. These are divided into: (1) Primary, as in spinal disease and arteriosclerosis; (2) the results of retrobulbar neu-

ritis; (3) postneuritic atrophy; (4) the result of the disease of the retina and choroid; (5) after compression or injury of the nerve; (6) unknown causes. Of 114 cases reported in 1921, 46 were postneuritic; 19, primary; 24 were caused by retrobulbar neuritis. Of these last, 23 were in patients who had recently suffered from acute infectious disease, generally typhus. There were 11 secondary to retinitis, and 3 were due to compression or injury to the nerve. There were 11 of unknown causation.

Parinaud's Conjunctivitis.

Dr. M. Sobhy Bey reported a case, probably of this character, occurring in a man of 40, who had previously suffered from trachoma. The left upper lid was pushed away from the globe by a flat granular tumor, starting from the temporal part of the tarsus, spreading over the nasal half and affecting the upper retrotarsal fold, mostly on the temporal side. Tuberculin test and Wassermann reaction were negative. The left submaxillary gland was enlarged and tender, but the preauricular gland was not. The seat of the lacrimal gland was tender and swollen. Inoculation of a young rabbit with a piece of the growth gave a negative result. In discussion, Dr. E. C. Fischer reported and showed photographs of a typical case of Parinaud's conjunctivitis.

Lymphangiomata of Face and Scalp.

Dr. M. Riad reported a case, illustrated by photograph, in which a man of 20 had noted swelling in the forhead 4 years before. There were soft indefinite tumors in the forehead, upper lids, right side of chin and scalp. A portion examined microscopically proved to be lymphangioma.

Primary Glaucoma in Egypt.

Dr. A. F. MacCallan pointed out the high incidence of glaucoma in Egypt, 2,254 cases out of the total of 127,223 persons presenting for treatment, could hardly escape the notice of any ophthalmologist practicing in Egypt. Because of delay in seeking treatment, 75 per cent of these cases were already blind in one or both eyes. The operation of election in uncomplicated chronic glaucoma has been trephining the corneosclera according to the method of Elliot, with iridectomy thru the trephine hole, which is made with 1.5 mm. trephine. In acute, and many cases of subacute glaucoma, the operation advised is iridectomy. The incision made with a Græfe knife, the iris incised with scissors at either extremity of the wound, which should be fairly peripheral. The iris is seized with forceps and torn away from its periphery. Trephining is not advisable in cases where there is opacity of the lens or a thin conjunctiva, nor where edema of the conjunctiva has been caused by previous use of eserin. During the year, 337 iridectomies and 492 trephinings with iridectomy had been done. Operation on both eyes was advised in all cases of glaucoma, even tho there were no clinical signs of glaucoma in the better eye.

Silver Nitrat Solutions for Conjunctival Disease.

Dr. M. Kamel urges that the 2 per cent solution of silver nitrat is not powerful enough to combat acute purulent ophthalmia or very chronic trachoma, and that its further dilution when applied renders it still more inefficient. He has gradually increased the strength to a 5 per cent colution, with encouraging and satisfactory results. He concludes such applications are appropriate for cases of obstinate ectropion in children, severe purulent ophthalmia with clear cornea. cases of purulent ophthalmia which resist the ordinary treatment, or are complicated by ulcers; cases in the third stage of trachoma with rough thickened conjunctiva, which do not improve under the usual methods but are thought to require excision; and those with recurring corneal infiltrations. It is not advisable to use it in less severe cases, as it is painful and irritating.

Ocular Complications in Malaria.

Dr. W. H. Kiep had observed the following conditions which he attributed to malaria: Dendritic or herpetic keratitis, deep seated central

parenchymatous keratitis, retinal and preretinal hemorrhages, optic neuritis, generally accompanied by retinal hemorrhages; paresis or paralysis of the seventh cranial nerve. He has not been able to decide that uveitis is caused by malaria. Of 63 cases of herpetic keratitis, 46 gave no history of previous eye trouble. The ocular condition might arise the same day as the initial malarial attack, or long afterward. In his experience, it was invariably unilateral, and arose from various forms of the plasmodium.

In all four cases of parenchymatous keratitis, the Wasermann was negative, there was no other evidence of syphilis and the keratitis was always unilateral. In each case, the parasite of benign tertian fever was found. The progress of the keratitis was slow, its duration averaging three months, and central permanent opacity of the cornea was left. With reference to retinal hemorrhage his experience agreed with that of Fischer, who found the cause of the hemorrhage to be the blocking of vessels with the malarial parasite, and published a case of connective tissue formation in the macular region from a film of extravasated blood. Kiep's ten cases might well be explained by occurrence of hemorrhage in obstructed retinal veins. In two cases, hemorrhage into the vitreous was followed by retinitis proliferans. Four of his cases also showed optic neuritis. He had seen seven cases of optic neuritis without hemorrhages, and 2 cases of postneuritic atrophy, which both gave negative Wassermann reaction. In the four cases of lagophthalmos, the trouble commenced when convalescence from cerebral malaria was established in one case, and in another after an attack of tertian malaria, and was aggravated in a subsequent attack of ague.

Adenoma of Meibomian Glands.

Dr. M. Sobhy Bey reported a case in which such a tumor simulated epithelioma. It had appeared three months before, was excised, and six months later was a small excavated ulcer, discharging yellowish debris. The margins were indurated and whitish globules were visible. The tumor was dissected out, and the microscope showed masses of glandular epithelium, surrounded by connective tissue.

Arteriovenous Aneurism of Orbit.

Dr. M. Tewfik reported a cure of a case by ligation of the common and external carotids. No tumor could be detected a year after the operation.

Palpebral Sporotrichosis.

Dr. M. Sobhey Bey reported a case occurring in a man 30 years old, who had noticed a swelling at the inner canthus 6 weeks before, followed by swelling of upper and lower lids. There was a shallow ulcer, 3 x 8 mm. in diameter, surrounded by brawny swelling, and a nodule as big as a pea in the lower lid; a similar one in the upper lid, and a cord like resistance going from the latter to the ulcer near the inner canthus. There was a history pointing towards lues, and enlarged glands over the body. Careful examinations failed to show spirochetes, but showed a branching mycelium with attached conidiae. A colony of the mycelium was of clear chocolate color, bounded with an irregular edge showing proturbances and convolutions. Inoculations of rabbits and a guinea pig were negative. Potassium iodid was ordered, beginning with 2 grams daily and reaching 10 grams in three weeks, when the ulcer was healed and the swelling had diminished.

Iridotomy for Glaucoma.

Dr. A. M. Girgis reported that the 9 cases operated on in 1920 had been seen within the last year, and all were successful. He presented a case, in which, after 16 months, the tension was 20 mm. of Hg., and the gap in the iris quite patent. He has done more cases in 1921, with success, and recommends the operation for all cases of chronic or acute glaucoma in which the tension is reduced by eserin.

Unilateral Congenital Ptosis.

Dr. Fakhry reported a case in a girl of 12, there being no other congenital defects, and the eye otherwise

normal. The operation of Motais was done with "marvelously good" results.

Intraorbital Tumor.

Dr. H. Abu Seif reported a case of a girl of ten, in whom the right eye had been slowly proptosed for 7 years. The lids hardly covered the globe. The orbit was exenterated. The tumor seemed to be a angiofibroma, which had started from the dura mater at the base of the frontal lobe and destroyed the roof of the orbit.

Scrofula and Phlyctenular Conjunctivitis.

Dr. M. Zaky reported a case which had resisted treatment; the glands of the neck were enlarging.

The following officers were elected for the ensuing year: President, Dr. Ahmad Fahmy El Rasheed Bey; Vice-President, Dr. Mahmoud Zaki; Honorary Secretary, Dr. Mohammad Mahfouz; Ass. Hon. Sec., Dr. Hassan Barrada; Honorary Treasurer and Archivist, Dr. A. F. MacCallan.

MEMPHIS SOCIETY OF OPHTHALMOLOGY.

September 22, 1922.

Tumor of Retina.

Dr. E. C. Ellett reported the case of a baby of six months, seen August 26th. Something was noticed wrong with R., since Aug. 10. The ball appeared enlarged, pupil dilated, a few posterior synechiae, and a yellowish mass in the vitreous with vessels on its surface. Tension plus two. Diagnosed glioma, and eye removed August 29th. The ball was not enlarged, measuring 20 mm. in diameter, the cornea being 14 mm. in diameter. The day of the operation, the anterior chamber was full of a cloudy material, so that the pupil could not be seen. Transillumination was not very satisfactory but seemed positive. On section the eye, which was shown, was filled with a yellowish mass, having the appearance of glioma. Microscopic sections not yet made. While under ether, the left pupil was dilated and the apparently normal left eye examined. Four d.d. down from the disc, and a little out, is a large white mass, projecting into the vitreous about 15 D. It is 3 d.d. in diameter, and the retina can be seen beyond it. No vessels on its surface. The eye has been seen by Dr. Lewis and Dr. Anthony.

Discussion.—Dr. Anthony has never seen a glioma this early in development, and by the fact that it has no vessels he does not think it a glioma.

Sequels of Cataract Extraction.

Dr. E. C. Ellett showed the patient, Mrs. J. H., age 61. Cataract extraction in another city July 15th. There is a prolapse of the inner pillar, and bands on the surface of the vitreous and an old corneal scar. Ever since the operation, the eye has been painful and slightly inflamed. Tension normal.

Discussion.—Dr. Stanford does not remember seeing striae so well developed. He has never heard this as being due to vitreous loss.

Dr. Simpson said that in any case where there is loss of vitreous, there has been a great deal of disturbance in the eye. There must be some uveitis going on all the time. He does not see why there should be so much pain.

Dr. Cook said there was some loss of vitreous at the time of operation. Extraction was done without undue force. He believed the pain due to incarceration of the iris in the scar.

Dr. Ellett did not know if it would do to relieve the iris now. The eye is not worth much treatment.

Secondary Glaucoma; Enucleation.

Dr. E. C. Ellett's patient, J. M., age 34. In March, 1917, was struck in the L. E. by a nail. After three weeks of pain and inflammation, the vision was lost. The eye has been painful at times. September 5, 1922, eye blind, pupil 7 mm. and fixed. A central corneal scar. Equatorial scleral staphyloma. Tension plus two. The condition was diagnosed as secondary glaucoma with resulting scleral staphyloma. Enucleation and glass ball implanted on September 6th. Catgut suture in Tenon's capsule and silk in conjunctiva. The eye has not been

sectioned, but the specimen was shown. An equatorial staphyloma involved three-fourths of the circumference of the eye. The ball was 35 mm. in vertical diameter, 32 mm. in the horizontal diameter and 30 mm. in anteroposterior diameter.

Discussion.—Dr. J. J. Shea saw the case first, several years ago, and the X-ray could show no foreign body.

Dr. E. C. Ellett said the interesting features are the development of secondary glaucoma; and, on account of the age, the sclera had yielded to a degree that it would not have done in an older person. Dr. Morax uses the bone taken from a calf's sternum and carves a ball from it. There is a possibility of it not being sterile, and the cosmetic results from a glass ball are very good.

Sac Removed for Dacryocystitis.

Dr. E. C. Ellett showed a microscopic section of a lacrimal sac removed for chronic dacryocystitis of five or six years duration. Patient was a lady, aged 76 years, with chronic glaucoma. The sac was removed preparatory to a trephine operation. R. E. practically blind from glaucoma simplex. T. 34 (Schiötz). L. 15/30 with glasses; field contracted, especially nasally. T. 28. Both nerves pale and cupped. The sac was removed with local anesthesia on July 22nd. Corneoscleral trephining with complete iridectomy September 6th. The latter operation was followed by minimum reaction.

ABSTRACTS.

S. Sgrosso: Retrobulbar Injections in Ocular Therapy. Arch. di Ott., 1922, vol. 39, page 131.

The author reports his results in the use of retrobulbar injections of stenosgene. This is a combination of strychnin, phosphorus, arsenic and formic acid, originated by Angelucci. He found it of special value in degenerations of the optic nerve, specific or otherwise, and it often helped where strychnin alone was of no effect. The first injections were made subcutaneously in the temple. Later subconjunctival injections were made, but the author believes that the best method of application is by retrobulbar injection, which allows the drug to act on the retina and nerve by direct diffusion. Besides its value in stimulating the elimination of toxic products, its hypertonicity is of effect in retinal detachments, in which it seemed to be better than sodium chlorid. After instilling 4% cocain in the conjunctival sac every three or four minutes, for fifteen minutes, the needle is inserted in the fornix at the lower outer angle and is pushed slightly down, back and inward for its whole length. Injections may also be made thru the skin in the same directions. There is no pain or local inflammation after the injection, but occasionally a slight chemosis. As a rule three injections a week were given, and injections were sometimes continued for several months. The cases reported comprise seven tabetic optic atrophies, all of which showed improvement in vision, which in some cases was quite marked. In one case the vision improved in one eye from light perception to 1/100, in another case from 1/100 to 1/20. Four cases of postneuritic atrophy are reported, one of alcohol and nicotin amblyopia, one of quinin amblyopia, all of which showed some improvement. Four cases of retinal detachment, all in high myopes, are reported, in all of which the detachment flattened considerably after a series of injections and in some of which vision was considerably improved. Eleven cases of iridochoroiditis and neuritis and retinal thrombosis are reported, in which, however, the retrobulbar injections were accompanied by antiluetic treatment, so that the effect of the injections was less definite. The author concludes that this method is of great value, especially in degenerations of the optic nerve. He believes that the visual improvement in these cases is to be explained by the fact, that the nerve fibers had not been destroyed but blocked by the accumulation of toxic products, whose elimination under the influence of treatment allowed them again to function. S. R. G.

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THE OPHTHALMIC YEAR BOOK.

After the completion of the present volume of the YEAR BOOK, the publication in quarterly parts under the name of "OPHTHALMIC LITERATURE" will give place to the form of an annual volume, that it had up to 1918. Inquiry among collaborators and friends of the Year Book has shown that some have a very strong preference for the annual volume; while none have expressed any decided preference for the magazine form, in which the last five volumes have appeared. Volume 19, bringing up the digest of the literature to December, 1922, is expected to be ready for distribution in June, 1923; and thereafter the annual volume will appear at about that season.

It is believed that the Year Book, as a cloth bound volume, will be more convenient and attractive to subscribers than the paper backed volumes, generally issued in Continental Europe. The bound volume will be much more readily preserved, and will not be so likely to be lost as are the present quarterly issues. By having the volumes bound before distribution, the cost of binding can be greatly diminished to the individual subscribers. This cost has enormously increased in the last five years. The expense of binding a single volume, in good cloth binding, is now from two to five dollars; varying with the style of binding and the place in which the work is done. But the additional price charged for volume 19 will be but one dollar, to those who subscribe for the Journal and Year Book in advance.

The Year Book undertakes: (1) Thru its bibliographies and indexes to place its readers in touch with the world's literature regarding ophthalmology, of the year preceding that in which it is published. (2) By the digest of the literature to call attention to all important new observations, methods and suggestions, that have been put forth in the time covered; not in the form of separate abstracts, but by bringing related matter together in an easily readable account, that presents the novel phases of the subject as gleaned from the work of different writers. Papers that are not regarded as important receive mere mention. (3) The matters treated of in the digest are carefully arranged. The plan of arrangement is the same from year to year; and, so far as practicable, the same general plan is followed in the dif-

ferent sections. Topics are grouped in this general order, anatomy, development and anomalies of the part; its physiology, diagnosis of conditions, acute inflammations, chronic diseases, specific conditions, and degenerations. Regarding each disease, the account takes up etiology and pathology, symptoms and diagnosis, cases and statistics, and prophylaxis and treatment.

It will be noticed that the Year Book does not attempt to give such abstracts as a writer, making a thoro study of a special subject, might wish to use, or quote from. This kind of Year Book would be of value chiefly to a few readers. The Ophthalmic Year Book is prepared, primarily, to keep the reading practitioner of ophthalmology informed regarding the whole literature of his specialty. Incidentally, it helps the writer, who is making an intensive study, by directing him to the papers which will be of most use to him, to consult as original sources, to study or quote from; and it indicates in a general way what special phase each paper treats of. When writers and advanced students in sufficient numbers are ready to support a different kind of Year Book, it will doubtless be forthcoming. Until then the only work of the kind in English should seek to give the most assistance to the greatest number. Adherence to this policy will make for the permanent continuance of the Year Book; and continuance is an important element in its usefulness, to even the most advanced and specialized student of ophthalmic literature. E. J.

THE CLOSING VOLUME.

This volume will exceed the last by about 100 pages. But on account of the change of paper made at the beginning of the year, it will be a little less bulky. Meanwhile Ophthalmic Literature has increased to an even greater extent, so that the two together represent an increase of over 30 per cent since 1918 in the amount of material furnished to our subscribers. The tendency is for this growth to go on, in spite of an increasing list of papers declined for lack of space. We have had but one rule in regard to accepting papers, and that has been to choose from those offered, such as we could publish in a reasonable time, that seemed to be of the greatest interest and value to the mass of readers.

Suggestions for the improvement of the JOURNAL will be most welcome. One does not have to assume the attitude of a superior being to offer constructive criticism, that may be of great value. We will not adopt such suggestions unless they are fully approved by our judgment and experience. But some of the best features of the JOURNAL and Year Book have come thru the suggestion of friendly critics. No enterprise can be permanently successful unless it has the means of drawing to itself new support and new life. We lose a certain number of subscribers each year thru death and retirement from practice. To help us get in touch with those who come up to take the vacant places is something that every subscriber can do for the JOURNAL and Year Book, in which we have a large common interest. E. J.

BOOK NOTICES

Ophthalmological Society of Egypt. Bulletin of 1922, 92 pages, 8 illustrations. Published by the Society, Cairo, Egypt.

The interesting scientific communications here published have been noticed elsewhere. They compare favorably in general and most of the proceedings of the ophthalmologic societies in the western world. This Bulletin shows keen interest in the annual meeting by an attendance of 60 out of 87 members. This interest and activity, where it might not be expected, reflects honor on Egyptian ophthalmologists; and illustrates the possibilities that open up before those who earnestly pursue the first object of this society "to study all branches of ophthalmologic science."

The illustrations add to the interest of this Bulletin. They include a temperature chart in a case of pseudomembranous conjunctivitis, 3 based on photographs of clinical cases, and four micro-

photographs showing the mycelium and conideae in a case of sporotrichosis. The instructions for sending specimens for examination are such as to serve an educational purpose, if attached to the transactions of any ophthalmologic society. At the Giza Ophthalmic Laboratory, the microscopic examination of tumors will be made free for members of the Society, if specimens are sent according to these instructions.

E. J.

Transactions of the College of Physicians of Philadelphia. Volume 43, for the year 1921; 660 pages, 25 illustrations. Published by the College, Philadelphia, Pa.

This volume has more of interest to the ophthalmologist than have the average transactions of general medical societies. The proceedings of the Section on Ophthalmology occupy 72 pages. This being the oldest section in the College, its proceedings are given first place in the appendix. They appear here as they have been published in this JOURNAL, and include some 46 different subjects.

Other papers of special interest take up: The Use of Gentian Violet in the Treatment of Infections, by John W. Churchman of New York; The Oculocardiac Reflex and Its Therapeutic Value, by Alfred Gordon; Differential Blood-pressure in Exophthalmic Goitre, by Joseph Sailer, and two papers on the Roger Bacon Cipher Manuscript, by W. M. Voynich and W. R. Newbold. These latter have interest because Roger Bacon is one of those to whom the invention of spectacles has been ascribed. Voynich has traced, with great probability, the romantic history of the manuscript; and Prof. Newbold reports some first results of undertaking to translate the cipher. These seem to show an acquaintance of Roger Bacon with the use of optical instruments, especially the telescope and microscope, hitherto unsuspected.

Other matters of general interest are: The account of the meeting in honor of Madame Curie, with the address of Dr. Abbe of New York, and papers on the physical and therapeutic properties of radium, by Prof. Goodspeed and Prof. Clark. Madame Curie's presentation to the College of an electrometer made by Prof. Curie, and the presentation of a memento of Lord Lister, and other interesting objects and books. This volume is one that well justifies the traditions of the College, preserved thru its 135 years of activity and service, and the high respect in which it is held by the medical profession of America.

E. J.

CORRESPONDENCE.

Ophthalmology in the Philippines

To the Editor: The practice of ophthalmology here in Manila, the capital and largest city in the Philippine Islands, with a population of almost 300,000, is taken up only by comparatively few. There are at present only some twelve specialists (Filipinos and Americans), and not one of them limits his practice to eye exclusively, but takes up ear, nose and throat cases as well. These few have to attend also to large numbers of patients coming from the provinces, where specialists are not available.

Personally, I would like to induce well trained American ophthalmologists to come and help us contribute, by way of original investigations, something to the science and practice of ophthalmology in the tropics.

I am enclosing herewith an article on cataract by Dr. Felisa Nicholás, which I would request you to publish in the JOURNAL if possible.. The author is unknown to you, and I presume you would require some information about her work and accomplishment. Dr. Nicolás is an instructor in the Department of Eye, Ear, Nose and Throat, University of the Philippines.

Hoping that this request will meet your kind and favorable consideration, I remain,

Yours truly,

ANTONIO S. FERNANDO.

Philippine General Hospital, Manila.

ABSTRACTS

Butler, T. Harrison, The Influence of Trauma Upon the Onset of Interstitial Keratitis. Brit. J. Ophth., v. VI, No. 9, 1922, p. 413.

The author points out the importance of the relationship in the operation of the Workmen's Compensation Act. The very meager statistics obtainable show that in about 3% of cases there is a history of trauma. The tendency is to regard the trauma rather as a coincident than a causal factor. Upon searching hospital records for ten years past, in which the question of accident was not inquired into routinely, the author found that 14% gave such a history. Later cases, in which careful inquiry was made, 25%. Patients were divided into two groups, those under and those over aged 14 years. There were fifty-nine cases, in which twelve (20%) gave a history of trauma.

The author's investigations suggest the following conclusions: (1) An attack of interstitial keratitis may be precipitated by an accident to a cornea which is disposed to the disease by syphilis or tubercle. (2) It is possible that a very slight trauma, such as the instillation of drops or the irritation of a general anesthetic, may have the same effect. (3) The attack in the injured eye is likely to be followed by interstitial keratitis in the uninjured eye. (4) It is possible that an injury to the eye may cause interstitial keratitis in the other eye. (5) The question may be asked: "Is it not possible that in every case of interstitial keratitis the attack is precipitated by some slight trauma?"

About a dozen illustrative case histories accompanies the contribution.

D. F. H.

Souques. Ophthalmoplegic Migrain. Hypothesis as to Its Anatomy and Pathologic Physiology. Soc. Méd. d. Hôp. June, 1922. Abst. Gaz. des Hôp. 1922, v. 95, p. 860.

The case was that of a man of 30, who had suffered from ophthalmic migrain since the age of 5 years. The attacks begin suddenly with an intense pain lying deep in the right temporofrontal region, which lasts 3 days and is accompanied by frequent vomiting of bile. This is followed 2 days later by a paralysis of the right oculomotor, which lasts about 12 days. The attacks recur every 3 or 4 weeks. For about 20 years, the paralysis has not disappeared completely between the attacks. For several years, complete ptosis did not appear at each attack, and the vomiting has ceased. The case is unusual because of its early onset and involvement of the abducens. It is probably due to a lesion at the region of the external wall of the cavernous sinus, tho there is the possibility of the presence of a "colloidoclassic diathesis" affecting the cerebrospinal region.

C. L.

Hagen, Sigurd. Tangential Sclerectomy in Glaucoma. Norsk Magazin for Laegevidenskaben, Vol. 83, p. 275.

This article is a report of 52 operations done according to Holth's method by Prof. Schiötz and by the author at the Rikshospitalet, Christiania. The cases were divided as follows: simple glaucoma, 40; buphthalmos, 6; secondary glaucoma, 4; and chronic inflammatory glaucoma, 1.

Complications: (a) During operation, hemorrhage in one case. (b) After operation, cataract in one case; prolonged hemorrhage in anterior chamber, 3 cases (with complete recovery); infections, none; iridocyclitis, 2 cases.

The tension at the discharge of the patients from the hospital was below the normal maximum (5.5/3) in all cases except in one which showed (5.5/2) and this became normal later. Readings were taken on 33 patients from 1 1/4 to 13 months after operation. Only 2 showed a tension above (5.5/3), and those were the two cases of iridocyclitis. The readings of the tension are given in the form of a fraction, in which the weight used represents the numerator and the scale mark of the Schiötz tonometer the denominator, as 5.5/3, and are not translated into mm. of mercury. The vision and fields appeared on the average unchanged. Unfortunately the writer does not tabulate the preoperative tensions. The immediate results

compare favorably with those of any other method, but too short time has yet elapsed to give final results.

D. L. T.

Mazzei. A Method of Recording Nystagmus. Arch. di Ott., Vol. 28, 1921, p. 28-36.

The author sums up previous methods devised for recording nystagmus both on the human eye and on experimental animals. In the author's own method, the extrinsic muscles are isolated and the recti are cut off from their scleral insertions, leaving intact only the muscle or group of muscles to be tested. The muscle is connected by a thread to a lever bearing an indicator, and the shadow made by this indicator is photographed on a revolving drum. Where it is desired to investigate antagonistic muscles, two levers and two drums are used. The nystagmus is produced by irrigating the external auditory canal with cold water. Twenty-six experiments are recorded, where only one muscle was cut. The nystagmus produced by the remaining muscles is seen to be limited in the field of the cut muscle. Cutting of all the muscles, except one, gives a record of the movements of that muscle. Where all the muscles except the internal and external rectus were cut, the tracing of one shows the rapid phase of nystagmus and that of the other the slow phase. By this method, the author expects to be able to study nystagmus in its different forms and its particular manifestations.

S. R. G.

Braun, G. Especial form of Epicanthus with Ptosis. Klin. M. f. Augenh. 1922, v. 68, p. 110.

Braun reports 6 cases. The especial form of epicanthus was that the fold of the skin originated in the lower lid and surrounded the medial end of the uninvolved upper lid in a small arc. The medial angle of the lid was not covered by the fold, but was displaced outward. The consequence was a shortening of the palpebral fissure, which had an oblique direction from down inward to upward outward. There was also complete congenital ptosis. Heredity played an important part also in this form.

With regard to the genesis, Braun assumes, that in the development of the lid and palpebral fissure in the embryo the medial lid angle is mechanically pushed back by the more intense progression of the central parts. Hence, the skin on the nasal side must form a fold. Under normal conditions, this fold is abolished by the conversion of the flat nose of the embryo into the high nose of the fetus.

Canthoplasty and operation of the ptosis according to Motais gave good results. As such cosmetic operations ought to be performed under local anesthesia, a sufficient maturity of the child must be attained.

C. Z.

Hessberg, R. Congenital family Entropion of Both Lower Lids. Klin. M. f. Augenh, 1922, v. 68, p. 120.

Hessberg observed this anomaly in 2 children of the same family, aged 2 and 3. Operations according to Birch-Hirschfeld gave good results. No anatomic anomalies could be ascertained. He assumed as primary cause, a certain weakness of the foundation of the lids, altho the tarsus seemed to be well developed. Secondarily, this was probably aggravated by tendency to spasm of the orbicularis in connection with the rachitic predisposition of both children, and the family history of tuberculosis.

C. Z.

Gibson, J. L. Papilledema. Brit. J. Ophth., v. VI, No. 9, 1922, p. 417.

Papilledema, as contradistinguished from other forms of neuroretinitis, is caused by intracranial tension. This tension is produced either by intracranial new growth, inflammatory conditions, or by chemical or microbic poisons. The increase resulting from poisons is likely due to irritations of the choroid plexus exciting excessive secretion. The author has treated in the following manner cases of papilledema due to plumbism, in which the optic disc advanced from 2 to 9 diopters: First, removal from their homes, so that further ingestion of the poison may not occur. Second, immediate lumbar puncture, resulting in the withdrawal under pressure of 6 or 8, or even 16 ounces of clear cerebrospinal fluid. This is repeated every third or fourth day, until the tension ceases to

be high. Seldom have more than three lumbar punctures to be done. Third, administration of magnesium sulphat and dilute sulphuric acid to render insoluble any lead in the intestines, and to cause its evacuation. Fourth, administration of iodid of potassium after intestinal canal has been cleared, not before. Fifth, deionization by the two bath method, to eliminate the lead from the body. At no time was a decompression operation necessary.

In gummatous cases as much as 8 diopters was observed. In some, lumbar puncture was done, but they were all at once put on mercurial inunctions and iodid of potassium. Several illustrative case histories accompany the contribution. As an appendix, three case histories of partial neuritic atrophy after ocular plumbism in children, are cited. The lead came from paint on the veranda rails. D. F. H.

Zirm, E. Periodic Exophthalmos and Congenital Enophthalmos. Wien. med. Woch. 1921. No. 24, p. 1091.

Zirm's case of exophthalmos had, in three months, eight attacks of edema of the eyelids with exophthalmos, affecting the right eye 6 times and the left eye twice.

His second case was one of congenital enophthalmos in a girl of 14. Mobility of eyeball upward and downward normal, outward no movements, inward, slight movement only, but the eye dips markedly into the orbit. The color of the iris in the enophthalmic eye was darker than its fellow. He also noticed the affected eye being softer.

H. A.

Young, George, Subconjunctival Advancement. British Journal of Ophth. 1922, Vol. 6, p. 323.

With a straight canaliculus knife, the tendon and belly of the muscle and the opposing surface of the sclera is rasped for a distance of about ¼ inch backwards. Two strong silk sutures are inserted in double loops thru the whole conjunctiva and muscle belly, one thru its upper half, and the second thru its lower half, and are again passed thru corresponding points at the limbus, where not only conjunctiva, but half the thickness of the sclera is taken up on the point of the needle. The two sutures, tied and firmly drawn together, will tuck the muscle on itself. The lumping disappears in a few months.

D. F. H.

NEWS ITEMS

DEATHS.

Dr. Charles H. Ansley, New Orleans, aged 49, died October 3rd from pernicious anemia.

Dr. G. Erwin Brinckerhoff, Oakland, California, aged 60, died October 3rd from angina pectoris and myocarditis.

Dr. Adelaide C. Duncan, Chicago, aged 56, died September 9th from bronchial asthma.

Dr. Henry Edmund Greene, Crawfordsville, Indiana, died October 2nd from chronic nephritis, at the age of fifty-five.

PERSONALS.

Dr. William C. Finnoff of Denver is in Vienna taking postgraduate work.

Dr. Melville Black, Denver was recently elected president of the Colorado State Medical Society.

Major A. G. Wade, West Point, has resigned from the Army, and will open an office at Vicksburg, Mississippi.

An announcement has just been received of the marriage, on October nineteenth, of Dr. Henry H. Martin and Miss Lena I. Bishop at Savannah, Georgia.

Dr. A. B. Middleton of Pontiac, Illinois, has been appointed head medical officer for the Illinois State Department of the American Legion.

Dr. Richard C. Gamble, of Chicago, is in Vienna taking a two months' course in ophthalmology. He goes from there to England, where he will continue his work at Moorfields.

Dr. Charles Chassaignac, Dean of the New Orleans Polyclinic, Post Graduate School of Medicine of the Tulane University of Louisiana, has been appointed medical superintendent of the Eye, Ear, Nose and Throat Hospital. New Orleans.

Dr. A. R. Ubaldo, the Chief of the Eye, Ear, Nose and Throat Department of the Philippine General Hospital of Manila, has recently inaugurated the Barraquer technic of intracapsular extraction of cataract with the improved erisiphake.

Dr. L. Webster Fox of Philadelphia was a guest of the Ophthalmic Section of the British Medical Association, which met in Glasgow in July. Mrs. L. Webster Fox, President of the Daughters of the British Empire in the United States, in her official capacity made a presentation of a circle of white heather to the grave of the Unknown Soldier at Westminster Abbey.

Dr. and Mrs. William A. Fisher, of Chicago, sailed on November 21 for a trip to India. Dr. Fisher expects to visit Dr. Holland in Shikarpur, who has done as many as 110 cataract extractions in one day. He expects to spend two weeks with Dr. Barraquer in Barcelona, and see Col. Henry Smith in London.

Professor Ernest Fuchs of Vienna, who is now on the last lap of a journey around the world, stopped off in Honolulu for three weeks of rest and sight seeing. While in Honolulu, Prof. Fuchs gave his lecture on "Arteriosclerosis of the Retinal Vessels", following a lunch given in his honor by the honorary staff of the Queen's Hospital. Prof. Fuchs also kindly consented to hold an informal clinic at the offices of Drs. J. A. Morgan and F. A. Plum.

MISCELLANEOUS.

The instruction in Ophthalmology and Otorhinolaryngology is now given in the third and fourth years of the undergraduate medical course of the University of the Philippines, instead of in the fifth year as formerly. The instruction in these subjects is now further aided by the use of lantern slides.

The Canadian Institute for the Blind recently opened a department for the administration of massage treatment and other forms of physical therapeutics, at Pearson Hall, Toronto, under the supervision of Dr. D. J. McDougall. Treatments will be given at these quarters, or masseurs will visit patients on prescription of a medical practitioner.

The Eyesight Conservation Council of America has elected a number of prominent educators to the board of councilors. Among them are Sidney E. Mezes, Ph.D., President of the College of the City of New York; Prof. Joseph E. Roe of New York University; Charles H. Judd, Ph.D., of the University of Chicago, and Francis C. Caldwell of Ohio State University.

The annual congress in France for the amelioration of the blind, recently held, voted unanimously in favor of the Cantonnet-Nouet system of writing as a means of communication between the blind and the seeing. This method is printed like the Braille, with a punch, but the holes are made to correspond to the outlines of the letters, so that the word can be read at a glance. It does not take the place of the Braille, but supplements it for those who do not understand the Braille.

The wording of an amendment to the Sanitary Code of the Board of Health of New York is somewhat strenuous. The portion referred to reads: "It shall be the duty of *every* physician, nurse, midwife or other persons in attendance on a confinement case, to instil in the eyes of the new-born child, a one percent solution of nitrate of silver." If the letter of the law is observed, the newborn child might have more silver solution instilled into its eyes than the law intended.

Current Literature

These are the titles of papers bearing on ophthalmology received in the past month. Later most of them will be noticed in Ophthalmic Literature. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-face type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is an abstract of the original article. (Bibl.) means bibliography and (Dis.) discussion published with a paper. Under repeated titles are given additional references to papers already noticed. To secure early mention, copies of papers or reprints should be sent to 217 Imperial Building, Denver, Colorado.

DIAGNOSIS.

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Csapody, S. v. Modification of Haab's ophthalmoscope. (1 ill.) Zeit. f. Augenh., 1922, v. 48, p. 232.

Downey, J. W., Jr. Radioactive photometers. A. J. O., 1922, v. 5, p. 840.

Gjessing, H. G. A. Tonometry. Brit. Jour. Ophth., 1922, v. 6, pp. 452-457.

Guist, G. Scleral illumination with arc light. (2 pl.) Zeit. f. Augenh., 1922, v. 48, pp. 219-231.

Haab. Ophthalmoscopy. Arch. f. Augenh., v. 85, p. 113. Abst. Ann. d'Ocul., 1922, v. 159, p. 699.

Handmann, M. Changes in anterior segment with tumor in posterior portion of eye. Klin. M. f. Augenh., 1922, v. 69, pp. 35-45.

Hotaling, E. E. Improvement in monocular amblyopia. Arch. of Optom., 1922, v. 1, p. 223.

Jackson, E. Examination of eye by direct sunlight. (4 ill.) J. A. M. A., 1922, v. 79, pp. 1216-1221.

Kurtz, J. I. Malingering. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 327-337.

Lemoine, P., and Valois, G. Sources of light in practical ophthalmoscopy. (2 ill.) Arch. d'Opht., 1922, v. 39, pp. 546-552.

Magitot, A. P. How to know blood pressure in vessels of retina. (5 ill. bibl.) A. J. O., 1922, v. 5, pp. 777-784.

Magitot and Bailliart. Blood pressure in vessels of eye. A. J. O., 1922, v. 5, pp. 824-828.

Yoshida. Examination of eye by polarized light. Nippon Gank. Zasshi, 1921, Sept.

Repeated title: **Birkhaueser.** (A. J. O., 1922, v. 5, p. 852). Inter. Med. and Surg. Survey, 1922, v. 4, (8a-263).

THERAPEUTICS.

Arlt, E. Afenil therapy in scrofulous eye disease. Klin. M. f. Augenh., 1922, v. 69, pp. 102-105.

Bartels. Milk injections. Zeit. f. Augenh., 1922, v. 48, p. 298.

Mori. Treatment of eye diseases with foreign proteins. Nippon Gank. Zasshi, 1921, Jan.

Patton, J. M. Pros and cons of foreign protein injections in affections of eye. Jour. Iowa State Med. Soc., 1922, v. 12, pp. 387-391.

Schanz, F. Treatment of ocular diseases with light. Münch. med. Woch., 1922, v. 69, p. 1341.

Repeated titles. **Guist.** (A. J. O., 1922, v. 5, p. 162). A. J. O., 1922, v. 5, p. 849. **Mazzei.** (A. J. O., 1922, v. 5, p. 330). A. J. O., 1922, v. 5, p. 845. **Schwarzkopf.** (A. J. O., 1922, v. 5, p. 852). Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-259). **Triebenstein, O.** (A. J. O., 1922, v. 5, p. 852). Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-258).

OPERATIONS.

Fromaget, C. Retrobulbar injections of novocain-adrenalin in ocular surgery. Ann. d'Ocul., 1922, v. 159, pp. 575-580. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-253).

Hessberg, R. Transplantation of fascia lata in eye. (3 ill. bibl.) Zeit. f. Augenh., 1922, v. 48, p. 349.

Repeated title. **Wick.** (A. J. O., 1922, v. 5, p. 852). Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-260).

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Gelhorn, E., and Wertheimer, E. Impression of parallelism. Arch. f. d. ges. Physiol., 1922, v. 194, p. 535. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-226).

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Mitchell, L. J. C. Absorption of ultraviolet rays by living tissue, spectacle glass and physiologic solutions. Med. Jour. Australia, 1922, Sept. 2, p. 268.

Sheard, C. Relation between radiant energy and vision. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 391-429.

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Argañaraz, R. Headache of ocular origin. Semana Med., 1922, June 15, pp. 994-1013.

Davies, M. C. Application of negative relative accommodation test to dynamic retinoscopy. Arch. of Optom., 1922, v. 1, p. 173.

Dohme, B. Correction of keratoconus with polished Zeiss contact glasses. Zeit. f. Augenh., 1922, v. 48, p. 106. Abst. Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-292).

Friedenwald, H. Changes in refraction. A. J. O., 1922, v. 5, p. 802.

Gallus, E. Refraction of Jews. Zeit. f. Augenh., 1922, v. 48, pp. 215-218.

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Heusen, H. Myopia operation after Fukula. Klin. M. f. Augenh., 1922, v. 69, pp. 89-93.

Ishizu. Origin of traumatic myopia. Nippon Gank. Zasshi, 1921, June.

Jackson, E. Taking the near point. A. J. O., 1922, v. 5, p. 837.

Kraemer, R. Refractometer of von Berth and Neuman. (2 ill.) Klin. M. f. Augenh., 1922, v. 69, pp. 93-100.

Krause, A. H. Inefficient accommodation vs. spasm of accommodation. Arch. of Optom., 1922, v. 1, p. 179.

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Nakashima. Influence of stenopaic slit and near point on vision. Nippon Gank. Zasshi, 1921, Oct., Nov., Dec.

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Ryer, E. L. Fixation control in dynamic retinoscopy. (11 ill.) Arch. of Optom., 1922, v. 1, p. 185.

Robinson, S. H. Oculoprism treatment. Amer. Jour. Phys. Optics, 1922, v. 3, pp. 366-390.

Sheard, C. Effective power of ophthalmic lens. (7 ill.) Amer. Jour. Phys. Optics, 1922, v. 3, pp. 338-347.

Sourasky, A. Errors of refraction in hyperthyroidism. Lancet, 1922, Sept. 16, pp. 611-612.

Torimi, Y. Visual power in astigmatism. Cent. Jour. of Ophth., Japan, 1922, v. 14.

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Repeated title. **Mazzei.** (A. J. O., 1922, v. 5, p. 852). Internatl. Med. and Surg. Survey, 1922, v. 4, (8a-308).

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Inagaki, M. Paralysis of externi due to cerebral tumor. Cent. Jour. of Ophth., Japan, 1922, v. 14.

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Lagrange, F., and Pesme, P. Oculomotor paralysis with anisocoria and miosis after spinal anesthesia. (bibl.) Arch. d'Opht., 1922, v. 39, pp. 503-508.

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